



Breakthrough

Corporate South Africa in a Green Economy

Edited by Godwell Nhamo



VISIT...

LANZAROTE
Caliente.COM

Breakthrough:

Corporate South Africa in a Green Economy

Edited by Godwell Nhamo



**Africa Institute
of South Africa**
Development Through Knowledge

BREAKTHROUGH: CORPORATE SOUTH AFRICA IN A GREEN ECONOMY

First Published in 2014 by the
Africa Institute of South Africa
PO Box 630
Pretoria 0001
South Africa

ISBN: 978-0-7983-0456-6

© Copyright Africa Institute of South Africa 2014

No part of this publication may be reproduced, stored in a retrieval system, or transmitted by any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission from the copyright owner. Any unauthorised copying could lead to civil liability and/or criminal sanctions.

To copy any part of this publication, you may contact DALRO for information and copyright clearance.



DRAMATIC ARTISTIC and LITERARY
RIGHTS ORGANISATION (Pty) LIMITED

Telephone: 086 12 DALRO (from within South Africa); +27 (0)11 712-8000

Telefax: +27 (0)11 403-9094

Postal Address: P O Box 31627, Braamfontein, 2017, South Africa

www.dalro.co.za

Any unauthorised copying could lead to civil liability and/or criminal sanctions.

Opinions expressed and conclusions arrived at in this book are those of the authors and should not be attributed to the Africa Institute of South Africa.

Project Manager: Mmakwena Chipu

Editing: Yvonne Thiebault

Proofreading: Alison Ziki

Design and Layout: Pamset

Printing: Impumelelo Print Solutions

The Africa Institute of South Africa is a think tank and research organization, focusing on political, socioeconomic, international and development issues in contemporary Africa. The Institute conducts research, publishes books, monographs, occasional papers, policy briefs and a quarterly journal – *Africa Insight*. The Institute holds regular seminars on issues of topical interest. It is also home to one of the best library and documentation centres world-wide, with materials on every African country.

For more information, contact the Africa Institute at PO Box 630, Pretoria 0001, South Africa; Email ai@ai.org.za; or visit our website at <http://www.ai.org.za>

Table of Contents

Foreword	vi
Preface	viii
Acknowledgements	ix
About the contributors	x
Abbreviations and acronyms	xvi
PART I: GREEN ECONOMY LANDSCAPE: INTERNATIONAL AND NATIONAL PERSPECTIVES	1
CHAPTER 1	
Business in the green global economy	3
<i>Godwell Nhamo and Nedson Pophiwa</i>	
CHAPTER 2	
Mapping the green economy landscape in South Africa	23
<i>Godwell Nhamo, Nedson Pophiwa and Mapula Tshangela</i>	
CHAPTER 3	
Third alternative to industrial development: Role of the NCPC in resource efficiency and cleaner production in South Africa	56
<i>Marié Uys and Sunette Steyn</i>	
PART II: MINING AND ENERGY	69
CHAPTER 4	
Exxaro: Powering possibility through clean and renewable energy technology ventures	71
<i>Muchaiteyi Togo</i>	
CHAPTER 5	
From methane curse to carbon trading at Gold Fields	92
<i>Letitia Greyling</i>	
CHAPTER 6	
Natural gas conversion: Sasol's low carbon transition flagship for the petrochemicals industry	112
<i>Shingirirai Savious Mutanga</i>	

Chapter 7

- Pele's renewable energy packages for households and small businesses across Africa** 135
Fumani Mthembu

PART III: BANKING AND INSURANCE 151

Chapter 8

- FirstRand's responsible financing and the green economy** 153
Godwell Nhamo

Chapter 9

- Nedbank and the transition to low carbon operations** 170
Alfred Bimha

Chapter 10

- Santam's eco-centric journey: Working with the Insurance Industry towards a Low Carbon Economy** 193
Soul Shava

PART IV: FOREST AND PAPER 207

Chapter 11

- Addressing climate change through resource efficiency and combined heat and power systems at Mondi** 209
Madeleine Fombad and Godwell Nhamo

Chapter 12

- Energy self-sufficiency for sustainably managed forestry and manufacturing operations at Sappi** 228
Memory Tekere

PART V: INDUSTRIAL 247

Chapter 13

- Linking carbon to culture at Altron** 249
Grant R. Howard, Andrew Johnston and Jannette Horn

Chapter 14

- Ensuring sustainability through strategy at Barloworld** 265
Godwell Nhamo

PART VI: RETAILING AND AVIATION	283
<i>Chapter 15</i>	
Pick 'n Pay's supply chain connectivity, food security and the green economy	285
<i>Godwell Nhamo</i>	
<i>Chapter 16</i>	
Addressing carbon reduction through civil aviation industry's four pillar strategy implementation at South African Airways	297
<i>Godwell Nhamo and Chipo Nyamwena-Mukonza</i>	
PART VII: LOOKING AHEAD	313
<i>Chapter 17</i>	
Emerging trends and learning points	315
<i>Godwell Nhamo</i>	

Foreword

We all look forward to a day when our visions and dreams become reality. However, despite hopes of a *breakthrough*, an 'Aha-a!' moment is seldom realised by the world. In relation to addressing the globe's key environmental challenges, change has over the past few years tended to be incremental and slow, and not without setbacks. In particular, despite a clear understanding of the risks that global warming poses for all of our futures and that of the planet, the hoped for agreement that would limit global temperature increase to below two degrees Celsius has not materialised. Nevertheless, worldwide there has been a slow but steady movement towards policies, technologies, and practices that have less emissions and less impact on the atmosphere and the environment.

The agenda to have the green economy accepted as one of the many tools in the context of sustainable development and poverty eradication emerged in 2008. In the preparatory session of the Rio+20, world governments and other key players including business and industry started debating one of the set thematic areas for the Rio+20 talks: Green Economy in the Context of Sustainable Development and Poverty Eradication. This narrative formed part of the Rio+20 outcomes document commonly known as *The Future We Want*. A notable feature of the Rio+20 Conference was the extent to which the corporate world stepped forward to indicate its commitment to sustainable practices and in particular engaged with the question of the linkages between environmental goods, practice and inclusive growth that would also address poverty and inequality. South Africa has been no exception to this. The South African Government has continued to play a leadership role internationally and for its part, corporate South Africa has stepped up to the plate too in terms of practical activities and environmental and corporate disclosure, and has also demonstrated a willingness to invest substantially in the green economy. Two key examples are the South African corporate taking the lead in the internationally run Carbon Disclosure Project, and the extent to which South African banks have financed the country's renewable energy roll out.

It is in this context that this book, *Breakthrough: Corporate South Africa in a Green Economy* was written. The authors realised that there was something that corporate South Africa could be commended for in the manner in which it was addressing sustainability issues, especially climate change and the need to reduce greenhouse gases as well as adapting to the changing climate. The green economy, therefore, becomes a platform that brings these issues into the context of implementation.

From the research done, exciting breakthroughs emerged. These include: Exxaro Resources Ltd's Powering Possibility Through Clean and Renewable Energy Technology ventures; 'From Methane Curse to Carbon Trading' at Gold Fields; Sasol's Natural Gas Conversion and their low carbon transition flagship for the petrochemicals industry; Pele's renewable energy packages for households and small businesses across Africa; FirstRand's 'Responsible

Financing and the Green Economy'; Nedbank's transition to low carbon operations; Santam's 'Eco-centric Journey: Working with the Insurance Industry Towards a Low Carbon Economy'; addressing climate change through resource efficiency and combined heat and power systems at Mondi; energy self-sufficiency for sustainably managed forestry and manufacturing operations at Sappi; 'Linking Carbon to Culture' at Altron; 'Ensuring Sustainability Through Strategy' at Barloworld; Pick n Pay's supply chain connectivity, food security, and the green economy; and SAA's response to civil aviation industry's drive towards low carbon skies.

It is our hope that recording these examples of corporate excellence will inspire and support the efforts of others in the private sector and so contribute to a much wider scale of initiatives and change.

Joanne Yawitch

Chief Executive Officer

National Business Initiative (NBI)

Preface

This book addresses issues pertaining to the manner in which corporate South Africa has engaged the emerging green and low carbon global economy. The book first profiles the green and low carbon economy landscape in South Africa, and then interfaces it with global trends. This way, the book aligns very well in terms of the Rio+20 outcomes document entitled ‘The Future We Want’ that fully embrace the green global economy in the context of sustainable development and poverty eradication. The rest of the chapters in the book profile breakthroughs from selected companies. The book also comes as the second in a series that is addressing global and national concerns on the green global economy agenda. The first book entitled *Green Economy and Climate Mitigation: Topics of Relevance to Africa* was produced as part of the 17th Session of the Conference of Parties’ collaborative work carried out by the Institute of Global Dialogue, the Africa Institute of South Africa, and Unisa’s Institute for Corporate Citizenship.

The book *Breakthrough: Corporate South Africa in a Green Economy* comes in seven parts. Part I focuses on the green economy landscape. This part considers both the international and national perspectives. Parts II-VI present different sector initiatives, namely mining and energy (Part II), banking and insurance (Part III), forestry and paper (Part IV), Industrial (Part V), and retailing and aviation (Part VI). The last part is made up of a single chapter dealing with emerging trends and learning points.

Professor Godwell Nhamo

Editor and Project Leader

Exxaro Chair in Business and Climate Change, Unisa

Acknowledgements

The book project leader and editor, Professor Godwell Nhamo, wishes to thank the following organisations and people for their generous support, financially and in kind. Exxaro Resources Ltd is acknowledged for its financial support since 2008, now running in the second phase: 2011–2015. The authors, blind peer reviewers, the CEMS Deanery, and the Institute for Corporate Citizenship had an invaluable input in the writing and publishing process. I also want to thank my family, especially my spouse Dr Senia Nhamo, and my children Anesu, Tsitsi and Makanaka Nhamo for all the support they continue to render towards my work. I also express my sincere thanks to the publishers, whom I hereby acknowledge for a quality product. This gesture will not be complete without acknowledging two of Unisa's executive management team members who drive the green economy and sustainability model with the championing it deserves: Principal and Vice-Chancellor of Unisa, Prof Mandla Makhanya, and Professor Divya Singh, Unisa Vice Principal: Advisory and Assurance Services.

The Peer Review Process

The book manuscript was subjected to the double blind peer review process through the Unisa Press mechanisms. The book manuscript was further subjected to the second set of blind peer review process by the Africa Institute of South Africa (AISA) before its publication. The editor presided over the incorporation of all blind peer review comments and observations in order to enhance the quality of the publication. Authors, however, take full responsibility of any liabilities associated with their work.

About the contributors

- **Alfred Bimha** is a lecturer of Banking in the Department of Finance, Banking and Risk Management which falls within the College of Economic and Management Sciences (CEMS) at the University of South Africa (Unisa). Mr Bimha holds a Master of Science in Banking and Financial Services, and a Bachelor of Commerce (Honours) in Banking from the National University of Science and Technology, Zimbabwe. Mr Bimha has great interest in business and climate change; carbon and environmental finance; sustainable banking; as well as general corporate finance issues. Some of Mr Bimha's current responsibilities are in teaching, research and training in investment analysis, and portfolio management short courses and programmes run by the Centre for Business Management at Unisa.

Mr Bimha has presented several conference papers with regards to carbon markets and carbon assets.

- **Andrew Johnston** is an admitted attorney and a fellow of the Chartered Institute of Secretaries. He is currently the group company secretary of the Altron group where his responsibilities include overseeing and managing the group's secretarial, governance, ethics and sustainability departments. Mr Johnston holds a BA LLB and a postgraduate diploma in Environmental Law from the University of Kwa Zulu Natal (KZN), Durban. He has also completed postgraduate certificates in Advanced Corporate Law and Securities Law (with distinction) at the University of South Africa (Unisa), and International Takeovers and Re-organisations at the University of Pretoria. He is a member of the Auditing and Accounting Task Force of the King Committee on Governance for South Africa, as well as a member of CRISA. He is a certified Ethics Officer with the Ethics Institute of South Africa as a director of the Corporate Lawyers Association of SA. Mr Johnston regularly contributes towards legal and secretarial publications in South Africa and lectures part time at GIBS and Rhodes University. He was recently invited to attend Harvard University's Business School in Boston, US, to co-present a Harvard Business Review case study to their MBA class.

- **Chipo Nyamwena-Mukonza** is a PhD student and researcher within the Institute of Economics Research on Innovation at Tshwane University of Technology. She is focusing on the economics of bio-fuels, examining the critical factors affecting production and distribution of bio-fuels. She also has great interest in technology adoption studies, energy, innovation, and green economy. She holds an MSc in Agriculture and Applied Economics, and a BSc Honours in Economics, both from

the University of Zimbabwe. She is also involved in teaching Economics, training, research, and consulting.

- **Fumani Mthembi** is the executive director of Research and Social Development at Pele Green Energy. She holds an MA Science, Society & Development from the University of Sussex. An academic background in politics, philosophy and economics underpins this. Previously, she worked for Standard Bank South Africa, in what was its newly established Community Banking division. Her main roles were the design of lending propositions for individuals and businesses, as well as building civil society partnerships for the bank. Prior to joining Pele, she worked as a researcher for the Human Sciences Research Council, doing policy reviews and situational analyses. Ms Mthembi is currently responsible for research, including primary data collection and analysis. She looks after the design and execution of the social inclusion propositions, stakeholder management and business development.

- **Godwell Nhamo** (Editor and Project Leader) is a chief researcher and chair for the Exxaro Chair in Business and Climate Change hosted by the Institute for Corporate Citizenship at the University of South Africa (Unisa). Professor Nhamo has great interest in business and climate change research as it manifests itself within the context of the green economy, poverty eradication, social inclusiveness and green jobs creation. Some of Professor Nhamo's research work has been in the broader environmental policy field. Professor Nhamo has published a number of papers addressing various policy perspectives on the Kyoto Protocol, climate change, and the green global economy.

- **Grant Howard** is an Information Systems lecturer in the School of Computing, College of Science, Engineering and Technology (CSET), at the University of South Africa (Unisa). He is a PhD student at the North-West University (NWU) in Mafikeng, South Africa. He obtained his Master of Science (MSc) degree in Information Systems at Unisa. He has authored papers published at peer-reviewed conferences, both local and international, and has a publication in an accredited journal. His research focus is information systems in the domain of organisational and environmental sustainability. Before becoming a lecturer he worked in the financial industry in South Africa as a business analyst.

- **Jannette Horn** is the group sustainability manager for Altron and is responsible for managing the sustainability agenda for the group. She has 16 years environmental consulting experience across a multitude of different industries and sectors, including mining, chemical, infrastructure development, and public and private partnerships. Her current responsibilities include development of sustainability

policies and frameworks; developing, implementing and monitoring environmental targets and initiatives; regulatory compliance; and participation in Global Reporting Initiative, JSE Socially Responsible Investment Index, Carbon Disclosure Project and the United Nations Global Compact.

- **Letitia Greyling** joined the Rhodes Business School in 2010, coordinating their environmental and sustainability cluster for their 'Leadership in Sustainability' MBA programme, short courses, and assisting businesses and government in mainstreaming environmental and sustainability management initiatives. Although she graduated within the scientific field with two MSc degrees – one from RAU (now UJ) and the other from UCT - and completed her MBA (Rhodes), her professional experience has been moulded in the corporate environment. Prior to joining the business school in Grahamstown, she was based in Johannesburg with Transnet National Ports Authority's head office for almost a decade until January 2010. She headed up the National Environmental Management Department, responsible for strategy and policy development (including the drafting of the National Ports Act, 2006). Alongside her team, she oversaw the implementation of sustainable and responsible initiatives at all commercial ports, ranging from port development projects (including the Port of Ngqura in the Coega developmental zone) to management systems for the port authority and its more than 750 tenants, nationally. In order to remain in touch with industry and government developments, she still consults part-time to these sectors, but has also done work with the UNEP (United Nations Environmental Programme), UNDP (UN Development Programme), and various regional and international institutions, especially on coastal and marine management, the role and integration of sustainability in businesses and managing environmental and sustainability risks and opportunities within organisations. She is also an Associate at International Oceans Institute, Southern Africa (IOI-SA).
- **Madeline Fombad** obtained a PhD from the University of Pretoria in the Department of Information Science with specialisation in Knowledge Management in 2010. She obtained a Masters degree in Library and Information Studies in 2002, a post-graduate diploma in Guidance and Counselling in 1996, and a Masters degree in Law at the University of Yaoundé Cameroon. She did her post-doctoral studies at the Collaborative Governance & Partnerships Research Programme at the Institute for Corporate Citizenship at the University of South Africa (Unisa). Her research areas are governance and accountability, knowledge management, public-private partnership, climate change, health governance, and stakeholder management. She has published eight articles in reviewed journals.

- **Mapula Tshangela** is a director for National Sustainable Development with the National Department of Environmental Affairs (DEA), which is responsible for sustainable development, sector green economy, and science-policy interface policies. She was previously the director for Policy Coordination and prior she was deputy director responsible for Pollution and Waste Information. Before joining DEA in 2007, Ms Tshangela was with Eskom as the Senior Environmental Advisor at Corporate Sustainability. From 2001 to 2006 she worked as the Environmental Practitioner in areas of air quality, water treatment, waste management, and environmental impact assessment at the Lethabo Power Station. Ms Tshangela started her career as a laboratory chemical technician in 1997 at Kendal Power Station. At the time of writing this work, Ms Tshangela was also a part-time PhD candidate focusing on policy and green economy at Stellenbosch University in South Africa. Ms Tshangela holds an MSc and a BSc Honours degree in Technology Management, BTech Project Management (Cum Laude), and National Diploma in Analytical Chemistry. She is also a registered Cert.Sci.Nat (Environmental Science). Ms Tshangela completed substantial executive programmes, including the Innovation for Economic Development with Harvard Kennedy School in the US.
- **Marié Uys** is a research assistant with the Collaborative Governance and Partnership Research Programme within the Institute for Corporate Citizenship (ICC). The ICC is situated within the College of Economic and Management Sciences (CEMS) within the University of South Africa (Unisa). Originally from the Northern Cape, Ms Uys relocated to Potchefstroom, completing her BA degree at the North-West University. She subsequently received her Honours and MA degrees at the same institution. In 2011 she joined Unisa after the completion of her studies. Her field of interest includes ethical research practices within universities, research focusing on community engagement practices, and collaborative governance and partnerships.
- **Memory Tekere** is an associate professor in Environmental Sciences at the University of South Africa (Unisa). Prior to joining Unisa, Professor Tekere was a lecturer in the Department of Biological Sciences from 2002–2007 at the University of Zimbabwe and senior lecturer in the Department Natural Resources Management at the University of Venda during 2008. She holds a DPhil Sciences specialising in Environmental Biotechnology and a BSc Honours (Biochemistry), both from the University of Zimbabwe. Professor Tekere has research experience and interests in Environmental Biotechnology and Micro-biology and her work focuses on bio-remediation of pollutants as well as the study of microbial diversity in different habitats, particularly extreme and polluted environments. Other areas of her research interest include water quality, municipal and industrial waste water treatment, and solid waste management. Her contribution to this book on the pulp

and paper industry was motivated by her research studies on ligninolytic white rot fungi, ligninolytic enzymes and their different environmental bio-potential applications.

- **Muchaiteyi Togo** is a deputy director in the Research Directorate of the South African Qualifications Authority (SAQA). She holds a PhD in Environmental Education from Rhodes University, South Africa, in which she explored the use of systems approaches in mainstreaming sustainable development in universities. Dr Togo is currently involved in research on green skills, articulation and progression within the National Qualifications Framework (NQF), and NQF impact studies. Her other research interests are in sustainability in universities and the corporate sector.
- **Nedson Pophiwa** is a chief researcher in the Human Sciences Research Council's Democracy, Governance and Service Delivery (DGSD) programme. His main research interests are in cross-border commerce, migration, sustainable development, and informal economies. Mr Pophiwa holds an MA in Forced Migration from the University of the Witwatersrand, and an MA in African Economic History from the University of Zimbabwe.
- **Shingirirai Savious Mutanga** is a research specialist in the Science and Technology Programme of the Africa Institute of South Africa (AISA). He is also a PhD candidate with the University of Pretoria, South Africa. He holds an MSc in Geo-Information Science and Earth Observation for Environmental Modelling and Management from a consortium of four universities namely Southampton (UK), Lund (Sweden), Warsaw Poland, and ITC (Netherlands), under the auspice of the prestigious Erasmus Mundus Scholarship. He holds a BSc Honours in Geography and Environmental Science from the Midlands State University in Zimbabwe. His research interests are in modelling global environmental issues, with a special focus on ecosystems transformation, complex social-ecological systems, Applied GIS, Remote Sensing and Systems Dynamics in climate change, energy and environment.
- **Soul Shava** is an environment education and sustainability specialist. He holds a PhD in Environmental Education from Rhodes University, South Africa. He is currently a senior lecturer in Environmental Education in the College of Education at the University of South Africa (Unisa). Dr Shava has research interests in indigenous knowledge research, its representation in knowledge generation processes at the interface of modern institutions and local communities, and its application in community development contexts and environmental education processes in Southern Africa, community-based natural resources management (CBNRM), socio-ecological resilience, climate change, intangible cultural heritage, traditional

agri-biodiversity conservation, and the use of traditional crops and indigenous food plants by local communities to achieve food security and resilience to climate change impacts.

- **Sunette Steyn** holds a BA (Cum Laude) from the University of Johannesburg, a BD (Cum Laude) from the University of Pretoria and a PhD also from the University of Pretoria. She has published articles and presented papers at national and international conferences on HIV/AIDS, gender, the politics of care, public-private partnerships (PPPs), multi-stakeholder collaborations, global health partnerships, the millennium development goals, and community engagement. She has also developed training material on PPPs and corporate social responsibility. From 2007–2010 Murray & Roberts supported Prof Steyn in establishing a subject field in partnerships at the Institute for Corporate Citizenship (ICC). Since 2011 she has been responsible for the Collaborative Governance and Partnership Research Programme at the ICC, which is situated within the College of Economic and Management Sciences (CEMS) at the University of South Africa (Unisa). Prof Steyn has received international recognition for her social innovations. She is a Paul Harris Fellow, a World Economic Forum Schwab Social Entrepreneur, a World Economic Forum Young Global Leader, and a member of the African Leadership Network.

Abbreviations and acronyms

ACC	=	Airport Carbon Accreditation
ACCA SA	=	Association of Chartered Certified Accountants South Africa
ACI Europe	=	Airport Council International Europe
ADB	=	Asian Development Bank
AFD	=	Agence Française de Développement
AfDB	=	African Development Bank
Altech	=	Allied Technologies Limited
Altron	=	Allied Electronics Corporation Limited
AR4	=	Fourth Assessment Report
ASISA	=	Association for Savings & Investment South Africa
ASTM	=	American Society for Testing Materials
ATAG	=	Air Transport Action Group
ATJ	=	Alcohol to Jet
ATM	=	Automated Teller Machine
ATNS	=	Air Transport Navigation Services
BASA	=	Banking Association South Africa
BP	=	British Petroleum
BTU	=	British Thermal Units
BUSA	=	Business Unity South Africa
Bytes	=	Bytes Technology Group (Proprietary) Limited
CAAFIC	=	Commercial Aviation Alternative Fuel
CCBS	=	Climate Community and Biodiversity Standard
CCLA	=	Climate Change Leadership Awards
CCS	=	Carbon Capture and Storage
CCT	=	Clean Coal Technologies
CDLI	=	Carbon Disclosure Leadership Index
CDM	=	Clean Development Mechanism
CPM	=	Cleaner Production Mechanism
CDP	=	Carbon Disclosure Project
CEO	=	Chief Executive Officer
CER	=	Certified Emission Reduction
CER	=	Carbon Emission Reductions
CFB	=	Circulating Fluidised-Bed
CHP	=	Combined Heat and Power
CINO	=	Combined Inventory and Network Optimisation
CLEEN	=	Continuous Lower Emission Energy and Noise

CMP7	= 7th Session of the Conference of the Parties serving as the Meeting of the Parties
CO ₂	= Carbon dioxide
CO ₂ e	= Carbon dioxide equivalent
COP	= Convention of Parties
COP17	= Seventeenth Session of the Conference of Parties
CP	= Cleaner Production
CPLI	= Carbon Performance Leadership Index
CRC	= Component Rebuild Centre
CRT	= Cathode Ray Tube
CSIR	= Council for Scientific and Industrial Research
CSR	= Corporate Social Responsibility
CSSA	= Chartered Secretaries Southern Africa
CTL	= Coal to Liquids
DBSA	= Development Bank of Southern Africa
DEA	= Department of Environmental Affairs
DEAT	= Department of Environmental Affairs and Tourism
DFI	= Development Finance Institution
DJSI	= Dow Jones Sustainability Index
DLC	= Dual Listed Company
DMR	= Department of Mineral Resources (South Africa)
DNA	= Designated National Authority
DoE	= Department of Energy
DPE	= Department of Public Enterprise
DSM	= Demand-Side Management
DTI	= Department of Trade and Industry
EIA	= Environmental Impact Assessment
EMAS	= Eco-Management and Audit Scheme
EMS	= Environmental Management System
EPC	= Energy Performance Contract
ERPA	= Emissions Reduction Purchase Agreement
ESG	= Environmental, Social and Governance
ESKOM	= South African Public Utility Electricity Supply Commission
ESRA	= Environmental and Social Risk Analysis
EST	= Environmentally Sound Technologies
EU ETS	= European Union Emission Trading Scheme
EU	= European Union
EWT	= Endangered Wildlife Trust
Exxaro	= Exxaro Resources limited
FAA	= Federal Aviation Administration
FBC	= Fluidised Bed Combustion

List of abbreviations

FDI	=	Foreign Direct Investment
FPAC	=	Forest Products Association of Canada
FSC	=	Forest Stewardship Council
FTE	=	Full Time Employee
FTFA	=	Food and Trees for Africa
GDP	=	Gross Domestic Produce
GER	=	Green Economy Report
GHG	=	Green House Gas
GHG Protocol	=	Greenhouse Gas Protocol
GNSS	=	Global Navigation Satellite System
GoSA	=	Government of South Africa's
GRI	=	Global Reporting Initiative
GSC	=	Group Sustainability Committee
GTL	=	Gas to Liquids
GTMT	=	Global Technical Management Team
GWP	=	Global Warming Potential
IATA	=	International Air Transport Association
IBF	=	Irish Banking Federation
IBTG	=	Inter-Banks Task Groups
ICAO	=	International Civil Aviation Organisation
ICC	=	International Chamber of Commerce
ICT	=	Information and communications technology
IDC	=	Industrial Development Corporation
IEA	=	International Energy Agency
IEE	=	Industrial Energy Efficiency
IGBP	=	International Geosphere-Biosphere Programme
IoDSA	=	Institute of Directors in Southern Africa
IPAP	=	Industrial Policy and Action Plan
IPCC	=	Inter-governmental Panel on Climate Change
IPP	=	Independent Power Producer
IPWM	=	Integrated Pollution and Waste Management White Paper
IRENA	=	International Renewable Energy Agency
IRP	=	Integrated Resource Plan
ISO	=	International Organisation for Standardisation
IT	=	Information Technology
JSE	=	Johannesburg Stock Exchange
JSE SRI	=	Johannesburg Stock Exchange Social Responsibility Index
KDC	=	Kloof-Driefontein Mining Complex
KPI	=	Key Performance Indicators
kW	=	Kilo watt
Kwh	=	Kilowatt per hour

kWh	=	Kilowatt-hours
LqCD	=	Liquid Crystal Display
LCD	=	Low Carbon Development
LED	=	Light Emitting Diode
LGEP	=	Limpopo Provincial Government's Green Economy Plan
LTMS	=	Long-Term Mitigation Scenarios
m ²	=	Square meters
MCEP	=	Manufacturing Competitiveness Enhancement Programme
MDB	=	Multilateral Development Bank
MDGs	=	Millennium Development Goals
MFI	=	Micro-Finance Institution
Mm3	=	Million Cubic Meters
MOA	=	Memorandum of Agreement
MtCO ₂ e	=	Metric Tonnes of Carbon Dioxide Equivalent
MTSF	=	Medium Term Strategic Framework
MW	=	Megawatt
NASDAQ	=	National Association of Securities Dealers Automated Quotations
NBI	=	National Business Initiative
NCE	=	Notional Cash Expenditure
NCPC	=	National Cleaner Production Centre
NCPC-SA	=	National Cleaner Production Centre of South Africa
NEMA	=	National Environmental Management Act (South Africa)
NERSA	=	National Energy Regulator of South Africa
NFSD	=	National Framework for Sustainable Development
NGO	=	Non-Governmental Organisation
NGP	=	National Growth Path
NMBM	=	Nelson Mandela Bay Municipality
NORA-SA	=	National Oil Recycling Association of South Africa
NPLs	=	Non-Performing Loans
NSSD1	=	National Strategy for Sustainable Development and Action Plan
NT	=	National Treasury
NWMS	=	National Waste Management Strategy
NYC	=	New York City
ODA	=	Official Development Assistance
PBN	=	Performance-Based Navigation
PCI	=	Pulverised Coal Injection
PDD	=	Project Design Document
PEFC	=	Programme for the Endorsement of Forest Certification
PGE	=	Pele Green Energy
Powertech	=	Power Technologies (Proprietary) Limited
PSI	=	Principles of Sustainable Insurance

List of abbreviations

RECP	=	Resource Efficiency and Cleaner Production
REDD	=	Reducing Emissions from Deforestation and Forest Degradation
REFIT	=	Renewable Energy Feed-In Tariff
RNP	=	Required Navigation Performance
ROI	=	Return on Investment
ROSE	=	Recycling Oil Serves the Environment
RSA	=	Republic of South Africa
SA	=	South Africa
SAA	=	South African Airways
SACAA	=	South African Civil Aviation Authority
SACRM	=	South African Coal Roadmap
SADC	=	Southern African Development Community
SAFL	=	Sasol Advanced Fuels Laboratory
SAIA	=	South African Insurance Association
SAICA	=	South African Institute of Chartered Accountants
SANParks	=	South African National Parks
SAQA	=	South African Qualifications Authority
SARPs	=	Standards and Recommended Practices
SASSDA	=	South African Stainless Steel Development Association
SDC	=	Sustainable Development Committee
SDLP	=	Sustainable Development Leadership Panel
SEMS	=	Social and Environmental Management System
SFAC	=	Sasol Fuels Application Centre
SFAs	=	Strategic Focus Areas
SFI	=	Sustainable Forestry Initiative
SHE	=	Safety, Health and Environmental
SHSD	=	Safety, Health and Sustainable Development
SME's	=	Small and Medium-size Enterprises
SMME's	=	Small, Medium and Micro Enterprises
SNE	=	Sasol New Energy
SNGP	=	Sasol Natural Gas Project
SRI	=	Socially Responsible Investment
SSA	=	Sub-Saharan Africa
SWH	=	Solar Water Heating
SWOT	=	Strength, Weakness, Opportunity, Threat
tCO ₂ e	=	Tons of Carbon Dioxide Equivalent
TEP	=	Tourism Enterprise Partnership
TIPS	=	Trade and Industrial Policies Strategy
TV	=	Television
UCB	=	United Commercial Bank Ltd
UK	=	United Kingdom

UN	=	United Nations
UNCED	=	United Nations Conference on Environment and Development
UNCSD	=	United Nations Conference on Sustainable Development
UNEP	=	United Nations Environment Programme
UNEP FI	=	United Nations Environment Programme's Finance Initiative
UNFCCC	=	United Nations Framework Convention on Climate Change
UNGC	=	United Nations Global Compact
UNIDO	=	United Nations Industrial Development Organisation
USA	=	United States of America
VBM	=	Value Based Management
VCS	=	Voluntary Carbon Standard
VCU	=	Voluntary Carbon Units
VER	=	Verified Emission Reductions
VOCs	=	Volatile Organic Compounds
WBCSD	=	World Business Council for Sustainable Development
WWF	=	World Wide Fund for Nature
WWF-SA	=	World Wide Fund for Nature – South Africa
YFS	=	Youth for Survival
YOY	=	Year on Year

Business in the green global economy

Godwell Nhamo and Nedson Pophiwa

INTRODUCTION

The writing is on the wall. The issue of a green (including low carbon) economy has found its way into many boardrooms and has since taken up residence there. This is in response to the greatest challenge humanity faces today – climate change. To this end, many corporates have prioritised the need to address the negative impacts associated with climate change and have put in place mechanisms to maximise opportunities that the phenomenon presents. It is now ‘business unusual’ and it will remain so well into the future. This book documents efforts made by corporate South Africa to address and move towards the green economy, that also inherently forces low carbon transition. Corporate South Africa mainly refers to South African companies. The publication stands out as one of many flagships and legacy projects driven by South Africa’s hosting of the 17th Session of the Conference of Parties (COP17) in 2011 as part of the United Nations Framework Convention on Climate Change (UNFCCC). The COP17 hosted in Durban is remembered for solidifying most of COP16’s Cancun Agreements, especially drawing up the governance mechanism of the Green Climate Fund. The embracing of the green economy by many corporates today links directly to increasing awareness relating to general environmental responsibility and, specifically, the climate change agenda.¹

DRIVERS TOWARDS GREEN ECONOMY TRANSITION

Three phases in mapping the transition to a green economy can be identified: the pre-Green Economy Phase (up to 2007); the Green Economy Transition Phase (2008–2009); and the Green Economy Phase (2010 onwards). This understanding is portrayed in Table 1.1. Since there is such a diverse range of drivers towards South Africa’s transition

to a green economy at both global and national levels, this chapter will focus on covering selected drivers at the international level. Selected national drivers will be dealt with in more depth in Chapter 2.

As reflected in Table 1.1, international drivers for the green economy include: the Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol on Substances that Deplete the Ozone Layer (as adjusted and amended in 1990); the UNFCCC, Kyoto Protocol; GHG Protocol; the ISO 14064; Copenhagen Accord; Green Stimulus Packages; the United Nations Environment Programme's (UNEP) Green Economy Initiative; Cancun Agreements; UN International Year of Sustainable Development and the COP17/CMP7 decisions. These and other landmark drivers will be briefly considered in the following paragraphs.

The Vienna Convention for the Protection of the Ozone Layer (which was adopted in 1985, and entered into force in 1988) aims firstly to protect human health and the environment against adverse effects resulting from human activities, and secondly to cooperate for better understanding of harmful substances to the Ozone Layer.² In order to protect human health and the environment from human activities that modify or are likely to modify the ozone layer, the Treaty urges the parties to take appropriate measures in accordance with the provisions in the Convention and its Protocols that are in force for that party.

Table 1.1 Drivers in South Africa's transition to a green economy

Scale/Typology of Green Economy Transition Driver	Pre-Green Economy Phase (up to 2007)	Green Economy Transition Phase (2008–2009)	Green Economy Phase (2010 onwards)
Global Level	• 1985: Vienna Convention for the Protection of the Ozone Layer • 1987: Montreal Protocol on Substances that Deplete the Ozone Layer of 1987 (as adjusted and amended in 1990) • 1992: UN Framework Convention on Climate Change (UNFCCC) • 1997: Kyoto Protocol • 2004: Greenhouse Gas Protocol • 2005: Ratification of the Kyoto Protocol • 2006: ISO 14064: For Greenhouse Gas Accounting and Verification • 2007: Bali Road Map	• 2009: Copenhagen Accord and Greenhouse Gas Emissions Pledges • 2009: Green Stimulus Packages • 2009: UNEP Green Economy Initiative	• 2010: Green Climate Fund Pledges • 2010: Cancun Agreements • 2010: The Carbon Neutral Protocol • 2011: UN International Year of sustainable Energy for All • 2011: COP17/CMP7 • 2012: Rio+20 (with a thematic focus on green economy in the context of sustainable development) • 2012: COP18/CMP8

Scale/Typology of Green Economy Transition Driver		Pre-Green Economy Phase (up to 2007)	Green Economy Transition Phase (2008–2009)	Green Economy Phase (2010 onwards)
National Level	Command-and-Control	• 1997: Ratification of the UNFCCC • 2002: Ratification of the Kyoto Protocol • 2004: National Climate Change Response Strategy • 2004: Regulations for the Establishment of the Designated National Authority • 2004: White Paper on the Promotion of Renewable Energy • 2005: Energy Efficiency Strategy • 2005: Sustainable Development Criteria for Clean Development Mechanism (CDM) Projects • 2007: Long-Term Mitigation Strategy passed	• 2008: National Energy Act • 2009: Regulations on Carbon Capture and Storage (exploratory work started) • 2009: Renewable Energy Feed-In Tariff (REFIT) Regulations • 2009: National Energy Efficiency Strategy • 2009: The Medium-Term Strategic Framework	• 2010: Draft Carbon Tax Option • 2010: Industry Policy Action Plan II (IPAP II) • 2010: Integrated Resources Plan (2010-2030) • 2010: National Climate Change Response Strategy Green Paper • 2010: New Growth Path • 2010: Western Cape Government Green Procurement Policy • 2011: State of the Nation Address and Budget Statement • 2011: Gauteng Green Economy Plan (under preparation) • 2011: Bidding for Renewable Energy Investments • 2011: Green Economy Accord • 2011: National Statements during COP17/CMP7 • 2012: Green Fund • 2013: Carbon Tax Policy Paper: Reducing greenhouse gas emissions and facilitating the transition to a green economy • 2013: Eskom gets go-ahead to build a 100MW wind farm from the National Energy Regulator
	Voluntary (Self-regulation) & Other Initiatives	• 2006: Energy Efficiency Accord • 2007: Carbon Disclosure Project (CDP) Launch	• 2008: CDP • 2009: King III Report • 2009: FIFA 2010 Green Goal Proposal • 2009: National Solar Water Heating (SWH) Strategic Framework • 2009: CDP	• 2010: Atlases - Wind, Carbon Capture and Storage, and Risk and Vulnerability • 2010: Green Economy Summit • 2010: Climate Change Criteria in JSE Socially Responsible Investment (JSE SRI) Index • 2010: CDP Water Disclosure Project • 2010: South African Fruit & Wine Industry Carbon Calculator • 2010: CDP • 2010: Gautrain (Speed Train) • 2010: Birth of Integrated Reporting • 2011: CDP • 2011: Hosting of COP17

The parties to the Vienna Convention for the Protection of the Ozone Layer are expected to:

- cooperate to better understand and assess the effects of human activities on the ozone layer and the effects of the modification of the ozone layer
- adopt appropriate measures and cooperate in harmonising appropriate policies to control the activities that are causing the modification of the ozone layer
- cooperate in the formulation of agreed measures for the implementation of this Convention
- cooperate with competent international bodies to implement effectively this Convention and protocols to which they are party.³

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer is one of the agreements that assisted the world in reducing ozone-depleting substances (ODSs). The Montreal Protocol falls under the Vienna Convention, which controls the production and consumption of the most commercially and environmentally significant ODSs listed in the Annexes to the Protocol. One feature of the Protocol that makes it unique is Article 6 that requires the control measures to be revised at least every four years (starting 1990), based on the review and assessment of latest available information on scientific, environmental, technical and economic aspects of the depletion of the ozone layer.⁴ Based on reports of assessment panels appointed by the Parties and taking into consideration the needs and situation of the developing countries, the Protocol has already been adjusted and amended twice.

The UNFCCC stands out as the visionary global framework that sets the foundation for the green global economy, as it speaks directly to the need to reduce greenhouse gas (GHG) emissions. The UNFCCC identified anthropogenic GHGs as the main contributing factor to global warming that leads to climate change. The framework then stipulated the need for humankind to do something in order to reduce the GHG emissions and save the planet.⁵ The UNFCCC also notes the provisions of the Vienna Convention for the Protection of the Ozone Layer of 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer of 1987 (as adjusted and amended in 1990). In 1997, the Kyoto Protocol was developed as an implementation instrument for the UNFCCC. The Kyoto Protocol set quotas for 37 industrialised countries to reduce their GHG emissions collectively by an average of 5,2 per cent based on 1990 levels between 2008 and 2012.⁶ Unfortunately the Kyoto Protocol did not enter into force until 2005.⁷ This, however, does not mean nothing was happening on the business front as companies engaged with the necessary Kyoto Protocol mechanisms that included the Clean Development Mechanism (CDM), and Joint Implementation and Emissions Trading⁸ to reduce GHG emissions from their operations.

In 2004, the World Business Council for Sustainable Development (WBCSD) in partnership with the World Resources Institute developed the Greenhouse Gas Protocol (GHG Protocol).⁹ The GHG Protocol divides GHG emissions into three scopes, namely: Scope 1 – Direct emissions coming from sources controlled by the company; Scope 2

– Indirect emissions coming from purchased electricity; and Scope 3 – Indirect emissions such as those from transportation or extraction of purchased materials. The GHG Protocol provides a conceptual framework for carbon accounting, and many companies in South Africa and internationally apply the GHG Protocol in carbon accounting. On another front, the International Standardisation Organisation (ISO) established the ISO 14064. The ISO 14064 focuses on GHG Accounting and Verification. The ISO 14064's key benefits include¹⁰ ensuring credibility, consistency and transparency in GHG quantification, monitoring, reporting and verification; increasing investor confidence by demonstrating to stakeholders and insurance companies that the organisation is managing and reducing its GHG emissions; facilitating the certification and trade of GHG emission reductions or removal enhancements; allowing entities to track performance and progress in the reduction of GHG emissions and/or increase in GHG removals; enhancing the company's brand equity; and cost saving by eliminating wastes and improving efficiency.

The Bali Road Map was put in place in 2007 as a framework to move global governments towards an agreement for the post-Kyoto Protocol framework by December 2009 during COP15 in Copenhagen. The Road Map has been popularised for drawing up a two-track global climate negotiation regime that follows the Long-Term Cooperation under the UNFCCC and the Kyoto Protocol Track.¹¹ Another landmark from the COP13 held in Bali was the clear delineation of issues that governments and businesses needed to address when deliberating on climate change and the future. These included: mitigation, adaptation, technology transfer, finance and capacity building.¹² With regards to business involvement in shaping the new global climate agenda, the Bali Action Plan indicates that 'the process shall be informed by, inter alia, the best available scientific information ... outputs from other relevant intergovernmental processes and insights from the business and research communities and civil society'.¹³ The same message is emphasised under 2(d) of Annex 1. Article 17(e) under the section dealing with mechanisms for technology transfer makes reference to Environmentally Sound Technologies (EST). Article 17(e) also encourages parties to scale up and/or develop innovative public-private financing mechanisms in order to enhance access to developing country project and business developers that play a role in transferring EST. The role of small and medium-size enterprises in transferring EST, especially in joint ventures, was highlighted.¹⁴

In Copenhagen, the path to a low carbon and greener global economy was set when a number of governments pledged to reduce their GHG emissions. Among the countries that initially pledged were the top emerging economies of Brazil, China, India, Mexico and South Africa.¹⁵ The idea of a Green Climate Fund as well as a Fast Start Climate Finance was mooted and this involved mobilising US\$30 billion between 2010 and 2012 and US\$100 billion annually by 2020.¹⁶ A number of countries also pledged various amounts towards the Fast Start Climate Finance. In Cancun, a total of 25 agreements were concluded, many of which fundamentally promote a low carbon and greener global economy such as Reducing Emissions from Deforestation and Forest Degradation plus (REDD+).¹⁷ The Green Climate Fund was adopted and the issues pertaining to carbon

capture and storage came to the fore. Furthermore, carbon trade as an intervention measure promoting transition to low carbon and greener economies was strengthened. Cancun also witnessed a significant honouring of financial pledges into the Fast Start Climate Fund.¹⁸ The operation modalities of the Green Climate Fund were to be finalised leading to COP17/CMP7 in 2011. This led to the establishment of the Green Climate Fund Transitional Committee.

Closer to home, the year 2011 witnessed the hosting of COP17/CMP7 on African soil in Durban, South Africa. By the conclusion of the meeting, 36 COP/CMP Agreements emerged. These included the need to extend the Kyoto Protocol to 2015, the need to have an all-inclusive global treaty by 2020, the operationalisation of the Green Climate Fund, REDD+, the adoption of the Carbon Capture and Storage Mechanism under the Clean Development Mechanism, Carbon Trade, Technology, Adaptation, Nationally Appropriate Mitigation Actions among others.

On 16 February 2011, the United Nations General Assembly proclaimed 2012 as the International Year of Sustainable Energy For All.¹⁹ The resolution reiterated the principles of the Rio Declaration of 1992 and the World Summit on Sustainable Development of 2002. The resolution also highlighted the desperate situation whereby three billion people in developing countries relied on biomass for cooking and heating and the fact that over one-and-a-half billion more had no access to electricity. The UN General Assembly further indicated that access to affordable modern energy in developing countries was an essential component towards meeting the Millennium Development Goals (MDGs) and sustainable development. Emphasis was put on the need to invest in cleaner energy technologies and a climate-resilient future. Given the above, all member states were encouraged to increase awareness of addressing energy issues, especially accessing low carbon-based sources and energy efficiency.

The global market place has also contributed significantly in the move towards the green economy. One such initiative came in 1999 when the Dow Jones Sustainability Indices, the first global indices tracking the financial performance of the leading sustainability-driven companies worldwide were launched. Based on the cooperation of Dow Jones Indices and SAM²⁰, these indices provide asset managers with reliable and objective benchmarks to manage sustainability portfolios. The assessment criteria are stated in Table 1.2.

Table 1.2 Corporate Sustainability Assessment Criteria

Dimension	Criteria	Weighting (%)
Economic	Codes of conduct/Compliance/Corruption & Bribery	6,0
	Corporate Governance	6,0
	Risk and Crisis Management	6,0
	Industry-Specific Criteria	Depends on industry
Environment	Environmental Reporting*	3,0
	Industry-Specific Criteria	Depends on industry
	Corporate Citizenship/Philanthropy	3,0
	Labour Practice Indicators	5,0
	Human Capital Development	5,5
	Social Reporting*	3,0
	Talent Attraction and Retention	5,5
	Industry-Specific Criteria	Depends on industry
*Criteria assessed based on publicly available information only		

Source: Dow Jones Sustainability Indices²¹

The DJS Indices evaluate the sustainability performance of the largest 2 500 companies listed on the Dow Jones and are the longest-running global sustainability benchmarks worldwide, becoming the key reference point in sustainability investing for investors and companies alike.²²

Another landmark development came in 2009 when the International Geosphere-Biosphere Programme (IGBP) launched the IGBP Climate-Change Index at the United Nations climate negotiations in Copenhagen on 9 December (COP15). The IGBP Climate-Change Index:

...brings together key indicators of global change: carbon dioxide, temperature, sea level and sea ice. The index gives an annual snapshot of how the planet's complex systems - the ice, the oceans, the land surface and the atmosphere - are responding to the changing climate. The index rises steadily from 1980 - the earliest date the index has been calculated. The change is unequivocal, it is global and, significantly, it is in one direction. The reason for concern becomes clear: in just 30 years we are witnessing major planetary-scale changes.²³

The idea came about when several IGBP scientists and their associates realised that the way various global datasets are reported throughout the year may be confusing; for it is uncoordinated, there are a variety of unfamiliar units, and natural variability sometimes

masks a trend.²⁴ A positive outcome of these indices is that there has been a shift towards using sustainable development indicators in board-level decision-making.

GREEN ECONOMY: A RECAP ON CONCEPTS AND DEFINITIONS

In 2008, UNEP came up with the Green Jobs Report that defined the green economy and provided case studies of different economic sectors that would need to be adapted and new ones to be formed in the transition to a green economy. The report defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.²⁵ For governments, this would include levelling the playing field for greener products by phasing out antiquated subsidies, reforming policies and providing new incentives, strengthening market infrastructure and market-based mechanisms, redirecting public investment, and greening public procurement. For the private sector, this would involve understanding and seizing the true opportunity represented by green economy transitions across a number of key sectors, and responding to policy reforms and price signals through higher levels of financing and investment.²⁶ Key aspects of the green economy are summarised in Table 1.3.

Table 1.3 Key aspects of the green economy and their benefit flows

Key aspect of the green economy	Benefit flows
1. A green economy recognises the value of, and invests in, natural capital.	Reducing deforestation and increasing reforestation make good economic sense in their own right, and also support agriculture and rural livelihoods.
	Greening agriculture offers a means to feed the world's growing population without undermining the sector's natural resource base.
	Growing water scarcity can be mitigated with policies to increase investments in improving water supply and efficiency.
2. A green economy is central to poverty alleviation.	By increasing investment in natural assets that are used by the poor to earn their livelihoods, the shift towards a green economy enhances livelihoods in many low-income areas.
	In many developing countries, one of the biggest opportunities to speed the transition to a green economy is to invest in the provision of clean water and sanitation services to the poor.
	Renewable energy can play a cost-effective role in a strategy to eliminate energy poverty.

Key aspect of the green economy	Benefit flows
3. A green economy creates jobs and enhances social equity.	A shift to a green economy means a shift in employment that, at a minimum, will create as many jobs as business as usual.
	In green investment scenarios, agriculture, buildings, forestry and transport sectors would see job growth in the short, medium, and long term exceeding their comparable business as usual scenarios.
	Allocating a minimum of 1% of global GDP to raise energy efficiency and expand the use of renewable energy will create additional jobs, while delivering competitive energy.
4. A green economy substitutes renewable energy and low-carbon technologies for fossil fuels.	Renewable energy presents major economic opportunities.
	Government policy has an essential role to play in enhancing incentives for investing in renewable energy.
5. A green economy promotes enhanced resource and energy efficiency.	Manufacturers face multiple opportunities for enhanced resource efficiency.
	There is abundant evidence that the global economy still has untapped opportunities to produce wealth using less material and energy resources.
	Recycling and energy recovery from waste are becoming more profitable and should continue to do so as waste materials become more valuable resources.
6. A green economy delivers more sustainable urban living and low-carbon mobility.	Promoting green cities raises efficiency and productivity.
	Constructing new green buildings and retrofitting existing energy-and resource-intensive buildings stock can achieve significant savings.
	Improving energy efficiency in the transport sector, adopting clean fuel and shifting from private to public and non-motorised transport can deliver significant economic and health benefits.
	The greening of most economic sectors would reduce GHG emissions significantly.
	A strategic policy agenda that integrates greening of a range of key economic sectors takes advantage of synergies and promotes long-term growth by mitigating scarcities.

Source: Adapted from UNEP²⁷

The adoption of a green economy in South Africa should also be understood in terms of the country's broader sustainable development trajectory as outlined in the National Framework for Sustainable Development (NFSD). The NFSD stipulates that:

South Africa aims to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by governance through national, regional and global collaboration.²⁸

According to the Green Economy Summit Report, South Africa understands the concept of green economy as 'a sustainable development path addressing the interdependence between economic growth, social protection and natural ecosystem'.²⁹ As such, the green

economy is said to refer to interlinked developmental outcomes for the South African economy: growing economic activity in the green industry sector and a shift in the economy as a whole towards cleaner industries or sectors with a low environmental impact compared to socio-economic impact.³⁰

Although the green economy concept enshrines the low carbon economy, these terms are at times used interchangeably. However, a low carbon economy tends to place an emphasis on energy. For example, the concept of Low Carbon Development (LCD) is defined as ‘actions which include making a contribution towards stabilising levels of CO₂ and other GHGs at a level that will avoid dangerous climate change through deep cuts in global emissions, demonstrate a high level of energy efficiency and use low-carbon energy sources’.³¹ Table 1.4 illustrates LCD by typology.

Table 1.4 Types of LCD

Types of LCD	Focus and approach
Green economy: Focuses on the production side of an economy and on how goods and services can be produced with lower emissions. It aims at de-coupling economic growth from carbon emissions (e.g. halving emissions, but doubling GDP).	Focus is mainly on mitigation, though adaptation also plays a role. Approach: Technological change, sectoral change
Green lifestyles: Focuses on the consumption side of a growing economy and on the consumer’s ability to reduce emissions by consuming climate-friendly products. It implies lifestyle and behavioural changes and also leads to a de-coupling of carbon emissions (e.g. halving emissions, but doubling GDP).	Focus is equally on mitigation and adaptation. Approach: Behavioural change, sectoral change, technological changes
Equilibrium economy: Focuses on the production side of an economy and aims at development rather than growth. No de-coupling is necessary as growth is neutral (e.g. halving emissions, but keeping GDP stable).	Focus is mainly on mitigation, though adaptation plays a role. Approach: Technological change, sectoral change
Coexistence with nature: Focuses on the consumption side of an economy and aims at development rather than growth. No de-coupling is necessary as growth is neutral (e.g. halving emissions, but keeping GDP stable).	Behavioural change, sectoral change, technological change

Source: Institute of Development Studies (2009)³²

What is evident in Table 1.4 is that both the green economy and the equilibrium economy approaches place emphasis on reducing the production of carbon through technological change, while the other two green lifestyles and coexistence with nature approaches emphasise reducing demand through lifestyle and behavioural changes.³³ It should be noted, however, that these options are not mutually exclusive and there may be need for a mix of production and consumption approaches.

METHODOLOGICAL ORIENTATION

The authors settled on a case study approach. To this end, a sampling method was determined leading to the selection of cases that would profile corporate South Africa's transition to a low carbon and green economy. The CDP 2010 Report was used as the main criteria to select the case studies. Both the Leadership and Performance Indices were used in the selection. A total of 26 out of the 100 companies were picked after applying the selection criteria. However, the final inclusion of the case studies within the book was determined by cooperation from the officials from the companies. Formal communication presenting a request to profile a selected company was opened between April and May 2011. In circumstances when responses were not forthcoming, telephonic conversations were undertaken.

The main data collection instrument was an open ended questionnaire that could either be emailed, used in face-to-face interviews or posted to the respondents. The last approach was not favoured. In addition, the researchers embarked on a detailed desktop analysis of literature covering the concerned companies and reviewing similar initiatives in the sector elsewhere. A literature survey had to be undertaken as a pre-condition prior to emailing the questionnaire.

In terms of the protocol to administer the pilot-tested questionnaire, the researchers had to first request respondents to complete the questionnaire. In the event that the questionnaire had adequate information, no further probing would be required. However, if the returned questionnaire had gaps, the researchers would follow up by way of further emails or telephone conversations. In certain circumstances, face-to-face interviews were also organised to clarify issues and gather more data and information. In as much as the sample for the case studies included top 26 companies from the CDP 2010 Report, the editor felt there were a few other companies and associations whose stories would add value to the book. These included the National Cleaner Production Centre (NCPC), Altron and Pele Green Energy. The companies identified using the CDP 2010 Report were: Anglo American; Anglo Platinum; Barloworld; Dimensions Data Holdings; Exxaro; FirstRand; Gold Fields; Impala Platinum Holdings; Kumba Iron Ore; Lonmin; MassMart Holdings; Medi-Clinic Corporation; Mondi Group; Murray and Roberts Group; Nedbank; Northam Platinum; Old Mutual; PicknPay; Remgro; Sanlam; Sappi; Sasol; The Bidvest Group; Vodacom Group; and Woolworths.³⁴ However, for various reasons that range from lack of response, slow responses and pull outs, not all the companies are documented in this book.

The questionnaire gave a brief background in terms of the key concepts applied, i.e., 'low carbon economy', 'green economy' and 'breakthrough'. The concept 'low carbon economy' from the questionnaire and this book was defined to refer to efforts made by a company or entity to reduce its GHG emissions in order to address climate change and other sustainable development aspects. Among the GHGs commonly addressed are: carbon dioxide, nitrogen oxide and methane.

A green economy was described as one that embraces the dictates of sustainable development by making sure that development addresses the three pillars namely: environmental sustainability, social sustainability and economic (financial) sustainability. However, given that for a long time and even today, many companies and entities battle to be environmentally sustainable (especially the need to address climate change, energy security, water stress, loss of biodiversity etc.) the case study book will document 'breakthroughs' in this space of engagement.

The concept 'breakthrough' was defined as an initiative that is linked to addressing green economy from both the internal and external perspectives of a company or entity. To this end, breakthroughs were enveloped in the six key thematic areas that aim to address the negative impacts of climate change that include: mitigation (GHG reduction efforts); adaptation (living with climate change); technology transfer (including research and development); capacity building and awareness raising; as well as finance.

Examples of 'breakthroughs' were highlighted in the questionnaire to include: green-ing supply chains and procurement; energy efficiency; movement towards renewable energy use or investment; carbon benchmarking or footprinting; efficient water usage; technological innovation; green financing and insurance; carbon accounting; green jobs and capacity building; and low carbon and green economy awareness raising.

Although the questionnaire provided a generic framework for data analysis and write up, the researchers were given the liberty to work within the framework in order to bring diversity to the products. The generic aspects probed by the questionnaire included: drivers to low carbon and green economy; enablers; flagship breakthrough; other low carbon and green economy initiatives; a company's future perspective in low carbon and green economy (including challenges encountered in transition to low carbon and green economy and planned activities); and any other observations.

BOOK OUTLINE

This book comes in seven parts. Part I focuses on the Green Economy Landscape. This part considers both the international and national perspectives. Parts II to VI present different sector initiatives namely: Mining and Energy (Part II), Banking and Insurance (Part III), Forest and Paper (Part IV), Industrial (Part V) and Retailing and Aviation (Part VI). The last part is made up of a single chapter dealing with emerging issues and the way forward. Synopses of the chapters contained within each part are presented in the next sub-sections.

PART I: GREEN ECONOMY LANDSCAPE

This part comprises chapters 1 to 3. Chapter 2 presents the green economy transition for South Africa as a breakthrough. The chapter maps the green economy landscape in South Africa. It emerges that a number of policy statements and frameworks have been put in place, especially in the first decade of the twenty-first Century. Such green economy interventions have emerged from both the government and the civil society and these draw significant insights from what is taking place in the international arena. Among the many South African green economy intervention policies from government considered in this chapter, the following are pertinent: Long-Term Mitigation Scenarios (document informing policy); Medium-Term Budget Policy Statement 2011; The New Growth Path; The Industrial Policy and Action Plan 2; The Medium-Term Strategic Framework; Green Economy Accord; National Development Plan Vision for 2030; role of the Development Bank of Southern Africa; and policy statements leading to and from COP17. Green economy interventions from the industry include: The CDP and CDP Water; King III (Integrated Reporting); and Climate Change Criteria on Johannesburg Stock Exchange Social Responsibility Index (JSE SRI). These and other important measures are the subject matter in this chapter. The aim of the chapter is to create a link and highlight the possible reasons why corporate South Africa has taken a decision to move towards a low carbon and green economy.

In Chapter 3, the National Cleaner Production Centre of South Africa (NCPC-SA) is profiled. It emerges that the NCPC-SA and its focus on resource efficiency and cleaner production within small and medium-size enterprises (SMEs) is the major breakthrough. Although challenges still exist with regard to the slow implementation of initiatives and recommendations from the NCPC-SA by the SMEs and other companies, success is being realised. This is showcased by the 61 production facility sites assessed by the NCPC-SA between April 2010 and March 2011.

PART II: MINING AND ENERGY

This part comprises chapters 4 to 7. For Exxaro Resources Ltd (Chapter 4), the establishment of an energy company through a joint venture with Indian-based Tata Power Company stands out as a major breakthrough. The energy company, called Cennergi, is based on renewable and clean energy technologies. The formation of the energy company was in direct response to real challenges that Exxaro was facing, which included: energy security, a high carbon footprint and possible future legal constraints to the coal industry, and climate change as well as related environmental issues. However, although Exxaro has a diversified mining portfolio, most of its profits are from coal. As such, the group will be negatively affected by any future constraints to the coal industry.

The aim of Exxaro's breakthrough project is to form an Independent Power Producer (IPP) that will generate power for South Africa through a mix of renewable and clean

energy sources. This is a development that set the pace in the South African energy industry with contributions to energy security and a reduction in carbon emissions both within Exxaro and in the country at large. Other benefits include a low carbon footprint and revenue generation. There are still areas in which Exxaro can improve, for example, developing Clean Development Mechanism projects. Inroads have already been made to ensure this move. The formation of an energy company was not the first green initiative at Exxaro. Before the establishment of Cennergi, Exxaro had embarked on a green housing initiative for its employees in Lephalale in Limpopo Province. The initiative had major environmental, social and economic benefits to the community.

Gold Fields Ltd's vision of being 'the global leader in sustainable gold mining' is a clear indication of which strategic drivers have been identified to differentiate it from other gold-mining companies. This case is covered in Chapter 5. For Gold Fields it is a strategic imperative to be able to flourish in a low carbon economy. As will be highlighted in this chapter, the company is already recognised as a leader in the South African mining industry in dealing with carbon-related issues. This mining group recognises and understands the changes in the world economy around restructuring the current carbon-based economy to a low carbon one. Furthermore, it realises that these changes will impact aspects of their business, ranging from carbon pricing in energy to stakeholder perceptions and views.

The company has therefore started implementing various initiatives within the organisation to facilitate and manage this transition process. Amongst others, they have established key forums to deal with carbon-related management issues, guided by a group-wide Carbon Management Strategy which was reviewed and updated in 2011. Gold Fields uses the opportunities presented by the sophisticated market mechanisms that have developed around the carbon credit market.

In 2010, the group became the first gold-mining company in the world to utilise and sell Certified Emissions Reductions (CERs). The CERs refer to the financial securities used to trade reduced carbon emissions in a carbon trade deal. These funds were used to finance Gold Fields' Beatrix Mine Methane Gas Project, a flagship breakthrough discussed in this chapter. In this project, the company set the scene for using carbon credits to fund this and other GHG and energy-saving projects at Gold Fields. The Beatrix case study speaks directly to how an innovative carbon credit project that showcases an organisation's low carbon business case can play a role within a low carbon and green economy.

While coal reserves present an opportunity for enhanced energy security, the Coal To Liquids (CTL) fuel process upon which Sasol's (Chapter 6) success has been built is a significant contributor to South Africa's GHG emissions. In response to the need to move toward lower carbon and greener operations, four distinctive Sasol initiatives are highlighted. These are energy efficiency, low carbon electricity, Carbon Capture and Storage (CCS) initiative and the Natural Gas Conversion project.

In 2008, Sasol established the New Energy Investment Company to drive a number of these initiatives. Sasol's Natural Gas Conversion project emerged as a major breakthrough

in the transitioning to a low carbon and greener economy. Based on estimates provided, the conversion to natural gas contributed towards improved air quality. Sasolburg emissions of sulphur dioxide and nitrogen oxide decreased by 35 per cent while carbon dioxide emissions reduced by 47 per cent, which is almost 3,3 million tonnes per year. Apart from the four main initiatives, Sasol has other green economy initiatives that revolve around water resources management, as well as research and development that are complemented by cutting edge technology.

Pele Green Energy's entry strategy into the rest of Africa through the distribution of off-grid energy generation units is a major breakthrough in Chapter 7. While the case is increasingly made for micro-finance institutions to provide lending and savings solutions for energy products, the business sensibility of this decision - from the product distributor's perspective - is seldom interrogated. The chapter, therefore, unpacks the case for doing business at the bottom of the African pyramid. The opacity of undeveloped markets, weak governments, poorly coordinated electricity production and supply, as well as pervasive poverty, are seen as being amongst the greatest constraints to participating in the energy markets as a commercial entity. However, developments in the Asian technology markets, coupled with new insights about how to package products and distribution methods for low-income consumers, make it possible to significantly mitigate business risk. Therefore, it is argued that there is a growing opportunity for distributors of energy-efficiency products to partner with micro-financiers and technology providers, in delivering energy to those previously excluded from modern energy supply.

PART III: BANKING AND INSURANCE

Part III is structured around chapters 8 to 10. The FirstRand group, covered in Chapter 8, sees itself as having an influence in the green economy through its responsible investment agenda. The group cites the need to support South Africa's low carbon and green economy agenda as one of the key drivers within its operation. Reported changes in climate and weather impacting negatively on the agricultural sector, especially in Africa to which the group provides extensive financing services, were also highlighted among the drivers. The group also has key investment clients operating in the carbon intensive sectors, such as mining and energy, that require significant transition towards a low carbon economy. With regards to enablers, FirstRand highlighted its internal mechanisms that are best represented by its network of green and low carbon policies, including the Environment Policy, Energy Management Strategy, ratification of the Equator Principles as well as the Climate Change Strategy, involvement in the Carbon Disclosure Project and being a signatory the South African Energy Accord.

Hence, these and other enablers have led the group to institute environmental and social reviews on all business-related loans, including green procurement elements in tender documents, financing renewable energy and energy efficiency, and attaining a paperless electronic account statement system in 2010. The WesBank Fairland Home is

a testimony in terms of how FirstRand has domesticated the green economy agenda. The ecoEnergy Loan and the eBucks are only a few of the mini-breakthrough initiatives building the group's responsible investment agenda narrative within the green economy.

The Nedbank Group Ltd was documented as a trendsetter in addressing climate change in the banking sector both nationally and across Africa. Chapter 9 deliberates on the Nedbank testimonial in depth. With its strategy of reducing before off-setting, a carbon neutral status has been achieved as a result of 20 years of environmental programmes put in place by the group. The success has been mainly driven by putting up a group-wide structure and policies that ensure the embedding of climate change programmes into everyday work operations.

Nedbank's emphasis has been on internal behavioural change in terms of reducing water, electricity and paper usage, further reducing waste from operations, business travel by air and rented business cars, which would ultimately reduce their carbon emissions. Behavioural change is indicated by the tCO₂e/FTE (carbon emissions per full-time employee) that has been steadily decreasing since 2007 when the first carbon footprint exercise was initiated by the group. As of 2007 the carbon emissions per full-time employee was 9,15 tCO₂e /FTE compared with the 2010 measure of 8,25 tCO₂e /FTE, which also translated to a financial saving of R36 million. Having put a solid plan to reduce carbon emissions, reduction in business travel by air has contributed significantly to the reduction of the group's total carbon emissions.

However, the carbon offsetting programmes - some being within the South African border and some within the African continent - have also been phenomenal and have generated enough carbon credits to ensure that they negate the excess carbon emissions against the set target after reducing them internally. The two carbon offsetting projects reviewed in this study - the Rukinga-Kasigau Corridor REDD project and Kibale National reforestation project - have gone beyond climate mitigation by creating jobs and other biodiversity benefits. The climate change efforts reviewed in this study have also allowed Nedbank to receive numerous accolades in terms of combating climate change through the bank's operations.

Climate change has had a notable impact on the insurance industry, prompting them to respond against growing scientific consensus that the frequency, intensity and geographical distribution of climate change related natural disasters is likely to increase in the foreseeable future. The emerging responses include supporting research into understanding climate change science, raising awareness and communication on climate change effects across the insurance industry and to clients, developing relevant insurance products, internal efforts to reduce the industry's carbon footprint and promote environmental sustainability, and collaborative efforts to address climate change effects. Chapter 10 looks at some of the insurance industry's responses to the impacts of climate change, with specific reference to a case study of Santam Ltd in South Africa. Santam's breakthrough initiative comes from its efforts to engage the insurance industry in South

Africa through climate change awareness processes and to create a platform for collaboration action on climate change.

PART IV: FOREST AND PAPER

Two chapters make up Part IV: chapters 11 and 12. Chapter 11 focuses on Mondi Ltd. There are many green economy initiatives that emerged from the Mondi case study. The initiatives fall within two key thematic areas, namely: forestry and climate change, and aspects relating to environmental performance. The flagship breakthrough for the group was identified as addressing climate change through resource efficiency and combined heat and power systems. This initiative resulted in electrical self-sufficiency at 93 per cent with all of its electricity consumed generated by combined heat and power. In addition, other green economy initiatives emerged and these included having all plantations in South Africa managed sustainably, and verified by the Forestry Stewardship Council certification; fuel switch; having 33 per cent of pulp consumed from recovered fibre; meeting and exceeding all environmental commitments relating to waste, emissions to air and water in 2010; increased use of renewable energy sources; and having water footprint data reported.

Sappi SA (Pty) Ltd is one of the major world players in the pulp and paper industry. In its endeavour to reduce GHG emissions and mitigate climate change, Sappi has put in place measures to reduce GHG emissions and increase renewable energy uses through streamlined transport systems, production process changes, installation of more efficient equipment, reduction in purchased energy and increased use of bio-fuels. To this effect a significant reduction in the carbon dioxide emissions per tonne of product produced has been achieved since 2005 to date. The percentage of energy derived from renewable resources for the South African operations is 38,1 per cent, and for Europe it is 31,8 per cent. The group's global figure stood at 48,6 per cent in 2010. Energy as an input is the major cost for the pulp and paper industry. Energy costs for Sappi ranged from US\$558 in 2008; US\$584 in 2009 and US\$626 per tonne in 2010.

It is against this backdrop in rising energy costs that Sappi decided to strive towards energy self-sufficiency and move towards producing own bio-fuels since the energy it purchases is mostly from carbon sources. Reducing the carbon footprint by improving energy-use efficiency and decreasing reliance on fossil fuels has been identified as one of the key strategic goals for Sappi. The enablers for Sappi's migration to renewable energy include its re-orientation of internal policy framework, institutional and human resources. Among the drivers to Sappi's migrating to low carbon and green economy are cost of carbon taxes, energy supply risk, energy opportunities and lastly reputational and marketing opportunities. The Sappi testimonial is featured in Chapter 12.

PART V: INDUSTRIAL

Chapters 13 and 14 make up the Industrial Part. Focusing on Altron, Chapter 13 reveals that essentially it is people, driven by their organisational cultures, who control the interaction between organisations and the environment. This makes organisational culture critical for combating climate change. This chapter profiles a business organisation that has made a low carbon breakthrough, affecting its organisational culture. Altron (Allied Electronics Corporation Limited) is a multi-billion rand company listed on the JSE in South Africa. Its businesses include telecommunications, multimedia, information technology and power electronics. Altron's top management drives its organisational culture with a breakthrough in the form of linking senior executives' key performance indicators and performance bonuses to measurable carbon reduction targets. Remuneration-linking clearly indicates that Altron is serious about its carbon reduction targets, and facilitates the necessary cultural changes for the transition to a low carbon and green economy. A low carbon organisational culture is the progressive weapon against climate change.

Barloworld Ltd entrenched a sustainable development culture into its strategy by identifying it as one of the six strategic focus areas. The identification of sustainable development as a strategic issue therefore stands out as the major breakthrough. Linked to this breakthrough are divisional initiatives including: energy and resulting emission efficiency improvements; products including supply chain optimisation tools (Combined Inventory and Network Optimisation and CAST-CO₂ Carbon Emissions Modelling); external and internal communication; rebuilding machines and components; green trailer; green buildings; carbon offsetting programme at Avis Rent-a-Car; water recycling and harvesting; and alternative fuel sponsorship. The Barloworld case is presented in Chapter 14.

PART VI: RETAILING AND AVIATION

The retail and aviation chapters make up Part VI and include chapters 15 and 16. Chapter 15 is reserved for Pick n Pay. This Group believes that its transition to a low green economy is driven by the six sustainability focus areas the group has determined. The group advocates that all the initiatives linked to the sustainability focus areas are important in having Pick n Pay move towards a green economy. The group realises that it is better positioned to influence other aspects of the green economy that include incentivising green agricultural practices, supporting sustainable small-holder agriculture, moving towards green logistics, creating markets for greener and more sustainable products and influencing consumer choices through product offering.

An investigation into the green economy and the civil aviation industry compelled the documenting of what the South African Airways (SAA) was doing to remain relevant. The SAA story, as informed by the global civil aviation industry sector, is showcased in Chapter 16. It emerged that the global civil aviation industry was on a huge drive to move towards a greener and low carbon economy through its four-pillar strategy. The

four-pillar strategy commits the global civil aviation industry to the use of: (1) cleaner fuels; (2) fuel efficiency; (3) route improvements, air traffic management and airport infrastructure improvements; (4) the implementation of positive economic instruments to achieve GHG reductions. The SAA has networked well into the four-pillar strategy. SAA indicated on 21 November 2011 that the airline should be using bio-fuels to satisfy half of its fuel demand by 2020.

PART VII: EMERGING ISSUES AND THE WAY FORWARD

This part comprises a single chapter, coming last in the book. The chapter focuses on emerging issues and the way forward.

NOTES AND REFERENCES

- 1 Nhamo, G., 2012. South African business and the Durban climate change negotiations: The role of business. Occasional Paper No. 63. Pretoria: Institute for Global Dialogue. p. 8.
- 2 UNEP., 2001. The Vienna Convention for the Protection of the Ozone Layer. Kenya: Ozone secretariat. Available at <http://www.unep.org/ozone>. [Accessed 19 November 2013].
- 3 Velders, G. J. M., Andersen, S.O., Daniel, J.S., Fahey, D.W. and McFarland, M., 2007. The importance of the Montreal Protocol in protecting climate. *PNAS*, 104(12), pp. 4814–4819.
- 4 UNEP. 2013. International regimes on ozone layer. Available at http://www.unescap.org/drpad/vc/orientation/legal/3_vienna.htm [Accessed 19 November 2013].
- 5 Ibid.
- 6 United Nations Framework Convention on Climate Change (UNFCCC), 1992. Bonn: UNFCCC secretariat.
- 7 UNFCCC., 1997. Kyoto Protocol. Bonn: UNFCCC secretariat. p. 3.
- 8 Nhamo, G., 2009. Climate Change: Double-Edged Sword for African Trade and Development. *International Journal of African Renaissance*, 4(2), pp. 117–139.
- 9 UNFCCC., 1997. Op cit, p. 11.
- 10 WBCSD and WRI., 2004. The Greenhouse Gas Protocol: A corporate accounting and reporting standard (Revised Edition). Washington DC: World Business Council for Sustainable Development and World Resources Institute.
- 11 ISO., 2006. ISO 14064 for greenhouse gas accounting and verification. Geneva: International Standardisation Organisation.
- 12 UNFCCC., 2007. Bali Road Map and Action Plan. Bonn: UNFCCC secretariat.
- 13 Ott, H., Sterk, W. and Watanabe, R., 2008. The Bali Roadmap: New Horizons For Global Climate Policy. *Climate Policy*, 8, pp. 91–95.
- 14 UNFCCC., 2007. Op cit. p. 6.
- 15 Ibid.
- 16 Nhamo, G., 2011. From Brazil's CDF to Kyoto's CDM: Revisiting equity issues in global climate governance. In Laurence Boulle (ed). *Globalisation and Governance*. Cape Town: Siberlink.
- 17 UNFCCC., 2009. Copenhagen Accord. Bonn: UNFCCC Secretariat.

- 18 UNFCCC., 2010. Cancun Press Release, 11 December 2010. Cancun: United Nations Framework Convention on Climate Change.
- 19 Nhamo, G., 2011. Op cit. pp. 130–145.
- 20 United Nations General Assembly., 2011. Resolution Adopted by the General Assembly 65/151: International Year of Sustainable Energy for All. New York: United Nations Secretariat.
- 21 SAM was founded in 1995 as the world's first asset management company focusing exclusively on Sustainability Investing. The firm's offering comprises asset management, indices and clean tech private equity. Available at <http://www.sam-group.com/int/about-us/history.jsp>. [Accessed 19 November 2013].
- 22 Dow Jones., 2010. Dow Jones Sustainability Indices. The First Decade: 1999–2009. New York: Dow Jones. p. 5.
- 23 Dow Jones., 2013. Dow Jones Sustainability Indices. Available at http://www.sustainability-index.com/07_html/other/aboutus.html [Accessed 19 November 2013].
- 24 International Geosphere-Biosphere Programme (IGBP)., 2013. IGBP Climate Change Index. Available at <http://www.igbp.net/5.1b8ae20512db692f2a680008616.html> [Accessed 19 November 2013].
- 25 International Geosphere-Biosphere Programme (IGBP)., 2013. Op Cit.
- 26 UNEP/ILO/IOE/ITUC., 2011. Green Jobs: Towards Decent Work in a Sustainable, Low Carbon World. Nairobi: UNEP/ILO/IOE/ITUC.
- 27 UNEP., 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers. Available at <http://www.unep.org/greeneconomy> [Accessed 19 November 2013].
- 28 Tabulated by authors from discussions on pp. 8–24 of the UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers. Available at <http://www.unep.org/greeneconomy> [Accessed 19 November 2013].
- 29 DEA (Department of Environmental Affairs)., 2010. Green Economy Summit, 18–22 May 2010. Pretoria: DEA, p. 4.
- 30 Ibid, p. 4.
- 31 Ibid.
- 32 Institute of Development Studies., 2009. After 2015: Pro-Poor Low Carbon Development. IDS In Focus Policy Briefing 9.4. p. 1.
- 33 Ibid, p. 2.
- 34 Ibid.
- 35 CDP (Carbon Disclosure Project)., 2010. Carbon Disclosure Project South Africa 2010. Johannesburg: National Business Initiative.

Mapping the green economy landscape in South Africa

Godwell Nhamo, Nedson Pophiwa and Mapula Tshangela

ABSTRACT

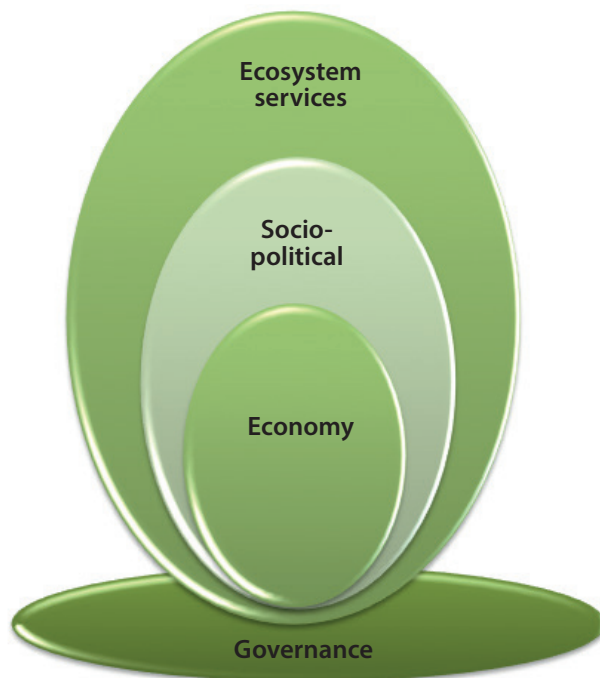
This chapter maps the green economy landscape in South Africa where many such policy interventions have emerged: the 2009 framework for responding to economic crisis; the Medium-Term Strategic Framework 2009–2014; the National Strategy for Sustainable Development and Action Plan (NSSD1 2011–2014); the Long-Term Mitigation Scenarios; the 2010 Green Economy Summit Report [Statement of Conclusion]; the National Climate Change Response White Paper; the Medium-Term Budget Policy Statement 2011; the New Growth Path; the Industrial Policy and Action Plan II; Environmental Fiscal Instruments; the draft Carbon Tax; the Ten-Year Innovation Plan; National Skills Development Strategy 3; Integrated Resource Plan II; The Medium-Term Strategic Framework 2009–2014; Green Economy Accord; National Development Plan: Vision 2030; and policy statements leading from COP17 to RIO+20. The green economy interventions from industry discussed in this chapter include the CDP and CDP Water, King III (Integrated Reporting), and Climate Change Criteria on the JSE SRI. The aim of the chapter is to create a link and highlight the possible reasons why corporate South Africa has taken the decision to move towards a green economy.

INTRODUCTION

There is a great opportunity in the development of industries that combat the negative effects of climate change. South Africa needs to develop strong capacity in green technologies and industries. Through our actions, we need to respond to the notion that there is a trade-off to be made between faster economic growth and the preservation of our environment (Jacob Zuma, President of the Republic of South Africa).¹

Considerable strides have been made in South Africa's transition towards a green economy. The same is occurring at the global level as captured in UNEP's report focusing on green economy transition that 'a transition to the green economy is already underway ... but the challenge is to build on this momentum'.² From white papers, draft policies, regulations and speeches by high-profile people in government and captains of industry - to the private sector and civil society initiatives, the phrase 'green economy' has become a strategic 'buzz word' in South Africa. This landscape is shaped by both command and control approaches of the state (as embedded in national legislation) and voluntary approaches driven by non-state actors, including those at the international level. Much of the momentum gathered is as a direct influence of the 2008 NFSD that culminated in the cabinet approval of the 2011–2014 NSSD1 a few years later. The NFSD carefully conceptualised the relationship between the three generic pillars of sustainable development and governance. The NFSD and NSSD1 adopted a systems approach to sustainability as one where the economic system, the socio-political system and the ecosystem are embedded within one another, and then integrated through the governance system that holds all the other systems together in a legitimate regulatory framework.³ (See Figure 2.1)

Figure 2.1 South Africa's systems approach to sustainability



Source: DEA

There is a global impetus towards a green economy and it is hardly surprising that South Africa, which seeks to grow its competitiveness in international markets, has decided

to follow suit. The global financial crisis of 2008 was a major driver that culminated in alternative thinking about green economic growth, stimulated by what Simmons refers to as the global 'crisis of the three Fs: *f*inancial, *f*uel and *f*ood'.⁴ An estimated 18 to 51 million people lost their jobs while the number of extremely poor increased by at least 100 million people worldwide. Rising fuel prices cost developing economies US\$400 billion in higher energy bills in 2007, while increasing food prices cost developing countries US\$324 billion in the same year.⁵

One could, therefore, ask what the drivers of green economy in South Africa are. In unpacking the context, the answer partly lies in what the 2010 Green Economy Summit [Statement of Conclusion] identified as key issues driving the 'green economy paradigm' in South Africa, and among them the following were noted:

- Substantial growth in investment is necessary to achieve climate change mitigation and adaptation (with or without a binding international agreement)
- There is an increased recognition that clean technology development offers significant business opportunities and gains
- There is a growing realisation that functioning ecosystems underpin all economic and social activity and that ecosystem failure will seriously compromise the country's ability to meet economic priorities even in the short term
- Natural resources are national assets and that most economies such as South Africa depend heavily on energy, biodiversity, agriculture, forestry, fishing and tourism.⁶

As stated in the preceding chapter, the DEA's definition of green economy is one that encompasses 'a sustainable development path based on addressing the interdependence between economic growth, social protection and the natural ecosystem'.⁷

South Africa was not immune to the effects of the global economic meltdown of 2008 whose impacts were still being felt through 2011 in Europe, with Portugal, Ireland, Greece and Spain (the PIGS) severely affected. In his address to the African Renaissance Conference in August 2011, the South African Minister of Trade and Industry, Dr Rob Davies, admitted that prior to the meltdown, the country 'achieved relatively high growth rates but this masks key structural problems'.⁸ He explained that the country's growth has been driven by unsustainable increases in credit extension and consumption (financial intermediation, insurance, real estate, transport, storage, communication, wholesale and retail, catering, accommodation) thus leading to a 7,7 per cent annual growth.⁹ In addition, production sectors such as agriculture, mining, manufacturing, electricity, water and construction grew by only 2,9 per cent annually, with a substantive recorded decline in manufacturing sector production. In the same vein, unemployment has remained as high as 25 per cent. The country's economy is therefore still recovering domestically from the global economic crisis. The 2009 framework for South Africa's response to the international economic crisis 'recognises opportunities ... agreed to develop incentives for

investment in a programme to create large numbers of “green jobs” ... where appropriate, build on current initiatives of greening existing manufacturing and service activities’.¹⁰

In this chapter, we consider how the green economy (incorporating low carbon growth and development) landscape of South Africa is driving corporate South Africa’s behaviour. The response to this chapter comes in the form of selected case studies documenting major green economy breakthroughs and other associated initiatives from the state and industry. The chapter concludes that the government, civil society and private sector are working towards embracing the notion of the green economy and have made progress. This does not necessarily discount some observation relating to bottlenecks encountered in transition to a green South African economy; a typical example being the shift from the use of Renewable Energy Feed-in Tariff (REFIT) systems to the bidding option. Critiques of the green economy in South Africa also continue to raise reservations with regard to brown energy and unclean extractive minerals, and natural resources extraction in the country.

POLICY INSTRUMENTS TO SUPPORT A GREEN ECONOMY

One could ask what the available policy instruments are, within the context of the international climate policy framework, to move South Africa towards a low carbon economy. Since government is the custodian of policies it is important to state that the South African governance system is divided into a three tier system. The first two are the national and the provincial governments, while the third one is the local or municipal government.¹¹ In this vein we explore how government has positioned itself to play a strategic role in the country’s transition process towards a resource efficient and low carbon economy. In the following sections we discuss some of the key policy frameworks and initiatives painting the green economy landscape in South Africa, among them the NSSD1, the Long-Term Mitigation Scenario (LTMS), National Growth Path (NGP), the Industrial Policy and Action Plan (IPAP2), the Medium-Term Strategic Framework (MTSF), the Green Economy Accord, the role of the Development Bank of Southern Africa (DBSA) in a green South African economy, draft Carbon Tax Policy as well as discussing other strategic and policy frameworks that guide low carbon and green economy responses at different levels.

NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT AND ACTION PLAN 2011–2014

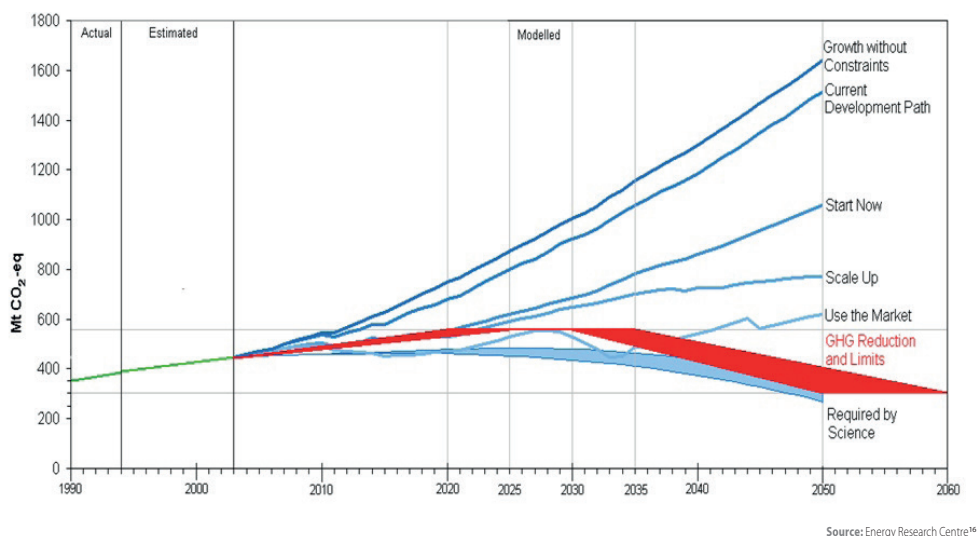
Five strategic objectives are identified in the 2011 cabinet approved NSSD1: (1) enhancing systems for integrated planning and implementation; (2) sustaining our ecosystems and using natural resources efficiently; (3) towards a green economy; (4) building sustainable communities; and (5) responding effectively to climate change. The objective of the green economy priority in the NSSD1 is to facilitate a fair transition towards a resource efficient, low carbon and pro-employment growth path.¹² At the 2010 Green Economy Summit, President Jacob Zuma pointed out that South Africa has no option but to manage

its natural resources in a sustainable manner and that it has no choice but to be eco-friendly and develop a green economy.¹³ Four of the 20 NSSD1 headline indicators are identified towards monitoring progress in the green economy. The four indicators are:

- Progress on the implementation of the nine green economy programmes [impact on social (jobs), economic (industry development) and environmental (ecosystem) benefits by 2014]
- Increase percentage (or amount) of financial resources ring-fenced/streamlined and spent for green economy programmes [2010/11 amount – Industrial Development Corporation (IDC): R11,7 billion, DBSA: R25 billion, Private: >R100 billion, National Treasury: R800 million]
- Number of patents, prototypes and technology demonstrators added to the intellectual property (IP) portfolio annually from funded or co-funded research programmes [five additions to the IP portfolio – patents, patent applications, licences and trademarks – by March 2014]
- Share of GDP of the Environmental Goods and Services (EGS) Sector [3% of GDP by 2014].¹⁴

LONG-TERM MITIGATION SCENARIOS

The LTMS was arguably the first document to introduce the notion of moving towards a low carbon South African economy.¹⁵ It recommended investments in alternative energies that were not part of twentieth-century South Africa. Investments in sectors that would use less energy per unit of economic output were deliberated upon as an option. Overall, the South African government opted to be informed by the scenario that would see the growth of carbon emissions peak (up to 2020), plateau (between 2020–2030) and decline (from 2035) as shown in Figure 2.2.

Figure 2.2 South Africa's plausible GHG emissions mitigation scenarios

The path shown in Figure 2.2 is based on the requirements of scientific projections where only a 'business unusual' approach will lead to the desired decline.

MEDIUM-TERM BUDGET POLICY STATEMENT 2011

In his Medium-term Budget Policy Statement (MTBPS) for 2011, Minister Pravin Gordhan spoke of green growth. In his view, South Africa's trade, industrial and energy policies required some alignment and fine tuning in order to promote the transition to a low carbon and green economy.¹⁷ Investment in the renewable energy sector by players from the private sector emerged as breakthroughs in this regard. Other initiatives from government, particularly the state's power utility Eskom that included electricity demand side management measures, were highlighted.

Climate change and the environment was also a subject for consideration in the policy statement. An amount of R6 billion was made available between 2008/09 and 2012/13 for energy-efficiency and electricity demand-side management initiatives. Projects benefiting from this fund include the installation of energy-efficient lighting, subsidies for solar water heating, as well as improvements in energy efficiency in buildings.¹⁸ The minister, however, noted a number of drawbacks in moving the green economy agenda forward in the country, with skills shortage emerging as key. The local sphere of government was singled out as critical in this regard. The minister also noted the progress made by the City of Cape Town, which was finalising plans to buy electricity from a wind farm while eThekweni municipality was also cited for its progress in sourcing and producing electricity from landfill methane gas.

THE NEW GROWTH PATH

The NGP outlines government's approach to accelerate growth and employment, focusing on several key drivers; (1) continuing and broadening public investment in infrastructure (2) targeting more labour-absorbing activities in the agricultural and mining value chains, manufacturing, construction and services (3) promoting innovation through 'green economy' initiatives (4) supporting rural development and regional integration.¹⁹ Amongst other crucial talking points of the NGP, it calls for state reforms to institutional structures and uses financial engineering to significantly increase the capacity and impact of the development finance institutions (DFIs), especially the IDC, for industrial financing. In this way, the IDC would ensure their activities maximise support for employment creation, as well as equitable and green growth.²⁰ Ambitious targets have been set in terms of job creation of about 300 000 additional direct jobs by 2020 to green the economy, with 80 000 in manufacturing and the rest in construction, operations and maintenance of new environmentally friendly infrastructure. By 2030 it is anticipated the potential for job creation will rise to well over 400 000.²¹

In line with the NGP, the Minister of Finance allocated financial resources in key strategic areas such as:

- The expanded public works programme will cost R73 billion over the next three years, including community-based projects, environmental and social programmes and maintenance of roads and infrastructure
- An unstated amount of funding will be allocated for renewable energy, environmental protection and 'green' economy initiatives
- Funding amounting to R800 million is set aside over the next three years for 'green economy' initiatives
- Additional allocations for research into energy-efficiency technologies are proposed, efforts to prevent wildlife trafficking and improved air quality, waste disposal and coastline management
- A total of R2,2 billion allocated for environmental employment programmes over the medium term and funding was provided for hosting the UNFCCC's 17th Session of the Conference of Parties (COP17) November 2011.²²

THE INDUSTRIAL POLICY AND ACTION PLAN 2

IPAP2 takes the initiative to coordinate activities of different government departments, agencies and state-owned enterprises towards the goal of industry development and ultimately job creation and poverty eradication. The IPAP2 forms part of a larger set of inter-related policies and strategies with respect to generating a NGP that is relatively more labour-intensive and value-adding. Thus, for example, Cluster 1 that looks at 'qualitatively new areas of focus' will prioritise growth in green and energy saving industries,

such as solar water heating, concentrated solar power, wind power and energy efficiency.²³ In summary, the following are IPAP2's focus areas:

- Industrial financing
- Leveraging procurement
- Developmental trade policies.

IPAP2's targeted sectors include: metals fabrication; capital and transport equipment; green and energy-saving industries; agro-processing; automotive components; medium and heavy commercial vehicles; downstream mineral beneficiation; plastics, pharmaceuticals and chemicals; clothing, textiles, footwear and leather; bio-fuels; forestry, paper and pulp; furniture; business process outsourcing; and advanced manufacturing.²⁴

It also addresses pertinent issues such as public sector procurement as well as trade policies aligned to industrial development. The issue of new procurement regulations is important for it will leverage the Department of Trade and Industry's (DTI) power to designate specific industries of strategic importance to the country's economy. IPAP2's sector priorities take into account South Africa's diverse economy and create a balance between creating and growing new sectors and stabilising and rejuvenating the existing industrial base.

THE MEDIUM-TERM STRATEGIC FRAMEWORK 2009–2014

The MTSF document is meant to guide planning and resource allocation across all the spheres of government. Its first strategic priority is targeted at 'speeding up growth and transforming the economy to create decent work and sustainable livelihoods'.²⁵ Recommendations are made to government that, in order to ensure longer-term growth, government must refine and scale up implementation of its Industrial Action Plan (IAP) to support broad-based industrialisation, including more advanced manufacturing as well as encouraging cleaner, lower-energy technologies and green jobs. Under Strategic Priority 9 – Sustainable Resource Management and Use – the MTSF prescribes that the pursuit of the concept of green jobs requires scaling up labour-intensive natural resources management practices that contribute to decent work and livelihood opportunities.²⁶

GREEN ECONOMY ACCORD

On 17 November 2011, the South African government and its alliance partners including organised labour, community organisations and organised business signed a Green Economy Accord (hereafter referred to as the Accord). The Accord highlighted that an estimated 300 000 jobs could be realised by 2020 if the country actively invested in a green economy.²⁷ The Accord is part of a follow up to the NGP discussed earlier in this section. Twelve cabinet ministers were actively involved in the discussions around the

Accord, namely the ministers of Energy, Economic Development, Environmental Affairs, Finance, Trade and Industry, Labour, Public Enterprises, Transport, Public Works, Higher Education and Training, Rural Development and Agriculture.²⁸ Business was represented by delegates from the country's largest companies as well as smaller enterprises and from green energy associations, while all three labour federations with a joint membership of more than 2,5 million workers were represented. Community representatives were drawn from women, the youth, cooperatives and civic formations.²⁹

Central to the Accord is the South African government's desire and ambitious plan to move towards a low carbon and greener economy, while increasing jobs and industrial development. The Accord stipulates commitments in twelve thematic areas that address, among other issues, solar water heating, increasing investment in green industrial activities and the promotion of green skills at technical levels. A summary of commitments by key implementing partners is presented in Table 2.1.

Table 2.1 Summary of commitments by implementing partners³⁰

Implementing partner	Commitment	Target date
Government	• Installation of one million solar water heating systems and to use this to expand the local production of components and heating systems • Procure 3 725 Megawatts of renewable energy for use in the grid • Provide a supportive regulatory environment to facilitate the development of a local bio-fuels industry • Invest R150 billion in mass-transport systems that will make it easier for South Africans to travel using public transport • Transnet to invest about R63 billion in the freight rail system • Finalise a Waste Innovation Programme that aims to promote reduced waste generation during production processes	• By 2014/15 • By 2016 • N/A • By 2014 and beyond • By 2016 • N/A
Insurance industry	• Promote use of locally manufactured solar water geysers for insured replacement	• 200 000 replaced annually
Organised labour	• Form cooperatives and/or social enterprises of retrenched employees to be trained in the installation and maintenance of solar water geysers • Establish joint workplace committees to discuss and implement energy efficiency plans	• Ongoing • Ongoing
Industrial Development Corporation (IDC)	• Funding of up to R25 billion for investments in green economy activities	• Up to 2016

Implementing partner	Commitment	Target date
Renewable energy industry (solar and wind)	• Create at least 50 000 green jobs in renewable energy activities • Install 300 000 solar PV power generation units on or at residential, commercial and industrial buildings • Work with government to create local industrial capacity, with an initial minimum target of 35% localisation as a first part of an aspirational target of 75% local content	• By 2020 • By 2020 • N/A
Business	• Develop benchmarks for sector and sub-sector energy efficiency and company energy-management • Work with government to pursue opportunities in the recycling, re-use and recovery of industrial waste	• N/A • N/A
Eskom	• Consider new technologies that can improve the energy efficiency of its existing coal-fired power stations	• Ongoing
All parties	• Support clean coal technologies applicable to power generation, including carbon capture and storage technologies • Promote the development of electric-powered vehicles • Promote manufacture of clean cooking stoves and heaters for the local and African market • Pursue proposals for including green awareness issues in future curriculum development in the education system	• Ongoing • Ongoing • Ongoing • Ongoing

NATIONAL DEVELOPMENT PLAN: VISION FOR 2030

The National Development Plan (NDP) dedicates Chapter 5 to addressing South Africa's agenda towards full transition to a low carbon and greener economy by 2030.³¹ The chapter starts by acknowledging President Jacob Zuma's 2009 Copenhagen pledge to reduce the greenhouse gas (GHGs). It is said to have stemmed from a year-long process of engaging stakeholders on climate change, with three high-level workshops and five roundtable discussions having taken place with individual stakeholders.³² To realise the vision, the NDP recognises the need for the country to address both climate change adaptation and mitigation. Thus by 2030 the following is envisaged of South Africa's low carbon growth path:

By 2030, South Africa's transition to a low carbon, resilient economy and just society is well under way. Having undertaken the difficult steps to adjust, all sectors of society are actively engaged in building a competitive, resource-efficient and inclusive future, and the country is starting to reap the benefits of this transition. South Africa has reduced its dependency on carbon, natural resources and energy, while balancing this transition with its objectives of increasing employment and reducing inequality. Development initiatives, especially in rural communities, are increasingly resilient to the impact of climate change, with mutual benefits between sustainable development and low-carbon growth quickly identified and exploited.³³

A summation of the three important phases in the transition to a low carbon economy is captured in Table 2.2.

Table 2.2 Vision 2030's phases of the transition to low carbon economy

By 2015	By 2020	By 2025–2030
Roles and institutional arrangements of the Climate Change Response White Paper must be institutionalised, established and staffed appropriately, and have developed processes and systems to carry out their mandate.	Carbon budget approach has evolved into an important and trusted tool, informing ongoing policy development and implementation and feeding into SA's international commitments.	Investment in low carbon and climate-resilient infrastructure in the previous decade is now starting to pay off.
SA's mitigation commitment is defined and actions are being taken.	Annual data on emission levels and climate impact feeds into policy and regulatory processes.	State is well capacitated and comfortably manages its policy, regulatory and support functions.
Carbon Tax is implemented, and in addition, a wider suite of mitigation policy instruments which target specific mitigation reduction opportunities aligned with a carbon budget approach.	International assistance has been secured for a number of mitigation projects, setting the path for alignment with global mitigation objectives.	SA has secured substantial international assistance and is aligned with objectives defined in its vision of mitigation.
SA is starting to access international assistance for adaptation and mitigation actions.	Resilience planning is integrated into all planning processes in the country.	Transition has been reconciled with SA's efforts to address poverty and inequality.
Significant investment programmes are in place for climate-related research and development and skills development.	A culture of energy efficiency in society is well established.	Carbon-budget approach has matured and is aligned with international best practice, guiding the allocation of absolute carbon constraints in the international climate mitigation policy framework.

Whilst the NDP can be seen as a trailblazer in charting a new strategic direction of growth that conserves the environment through low carbon and green economy, the plan has some critics. One critique is that overall the plan is 'a summation and amalgamation of existing government policy...the national plan reads like a high-level summary of all that currently exists in government'.³⁴ Also, the controversial issue that environmentalists have contention with is the policy on fracking which the plan views as a low carbon solution. One would agree with analysts who are of the view that by including fracking in the plan's 2030 vision, the Planning Commission hopes this will give an opportunity for public debate on the matter as it attracts a lot of attention from stakeholders.³⁵ Nevertheless, the inclusion of low carbon economy in this 440-page vision document attests to the fact that the green and low carbon economy landscape of South Africa has taken shape especially from the command side.

NATIONAL CLIMATE CHANGE RESPONSE WHITE PAPER

The South African government regards climate change as one of the greatest threats to sustainable development and believes that climate change, if unmitigated, has the potential to undo or undermine many of the positive advances made in meeting South Africa's own development goals and the Millennium Development Goals (MDGs). The National Climate Change Response aims to limit jobs contraction to those areas of the economy where excessive carbon intensity is unsustainable, while promoting and expanding the green economy sectors. It also aims to promote investment in human and productive resources that will grow the green economy. Estimates for the cost of responding to climate change indicate that between 1 per cent and 2,5 per cent of global Gross Domestic Product (GDP) will need to be spent on mitigation and 1,5 per cent to 3 per cent of GDP in Africa will need to be spent on adaptation by 2030. Impacts (and benefits) will be unevenly distributed across countries and between sectors.³⁶

GREEN ECONOMY MODEL FOR SOUTH AFRICA

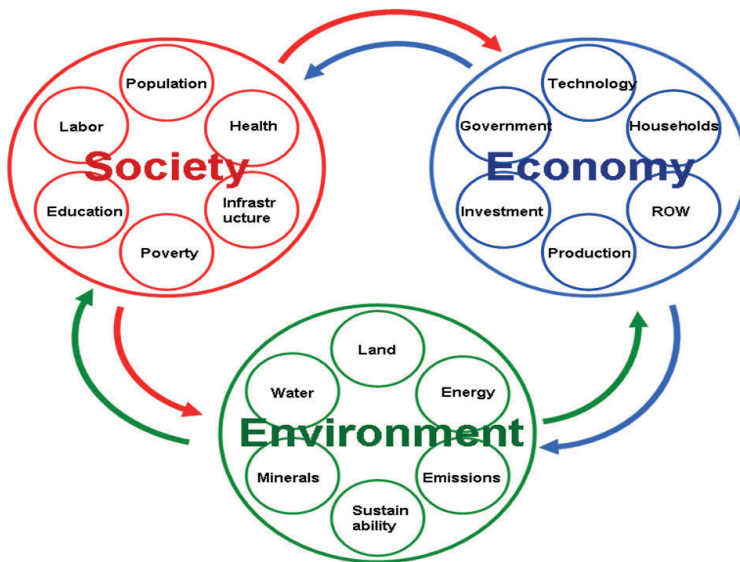
The green economy modelling report for South Africa was launched in July 2013 by the Minister of Water and Environmental Affairs. The report has its roots in the outcomes on the national Green Economy Summit that took place in May 2010, whereby an implementation plan for the environment sector's contribution to the green economy was developed.³⁷ Nine key focus areas were identified at the summit:

- Resource conservation and management
- Sustainable waste management practices
- Water management
- Environmental sustainability
- Green buildings and the built environment
- Sustainable transport and infrastructure
- Clean energy and energy efficiency
- Agriculture, food production and forestry
- Sustainable consumption and production.³⁸

The key players involved in designing the model comprise the Department of Environmental Affairs (DEA), the United Nations Environment Programme (UNEP), the Millennium Institute based in the US and the Sustainability Institute in partnership with the University of Stellenbosch.³⁹ The concept of a green economy model for South Africa was launched at the Durban COP17 Africa Pavilion side event on 1 December 2011. This modelling report draws insights from NSSD1, which has transition to a green economy and addressing climate change highlighted among the priorities listed.⁴⁰ The Threshold 21 (T21) Model developed by the Millennium Institute was selected as the preferred model

due to its consideration of social, economic and environmental aspects. The T21 Model applies systems thinking and the manner in which various components to be modelled are grouped into three major sustainability pillars that interact in line with the NSSDI context. The T21 represented in Figure 2.3 was tailored for the South African context and addressed only 14 sectors namely: government, production, investment and household, population, education, employment, public infrastructure, health, land, minerals, emissions, natural resource management, energy and water.

Figure 2.3 Components of the T21 Model



Source: Millennium Institute⁴¹

The South Africa green economy model is also conducted along the lines of the UNEP Green Economy Report (GER) modelling that applied the T21. In modelling for the South African context, a stakeholder workshop was hosted on 1 February 2012 to prioritise at least four of the nine key focus areas for modelling. The follow-up stakeholder workshop was hosted on 18 June 2012. The South Africa green economy modelling uses targets defined by the NGP – for the medium term (2020), and the NDP – for the longer term (2030), which are quantifiable for the modelling process.⁴²

The T21 model is already used in countries such as Kenya, China, Mali, Denmark, United States, Ecuador and Mauritius.⁴³ In Kenya for example, the T21 Model was to be customised to enable simulations of policies to attain MDGs and its Vision 2030, among others.⁴⁴ The South African green economy modelling process examined the hypothesis that a correct management of natural resources does not necessarily imply accepting lower economic growth going forward. Instead, it explored the question of whether equal or higher growth could be attained with a move sustainable, equitable and resilient

economy, in which natural resources would be preserved through more efficient use. The key messages of the South African green economy modelling are that:

- A Green Economy grows faster than a brown economy over time, while maintaining and restoring natural capital
- Business-as-usual (BAU) can only deliver development gains at an unaffordable, and probably unsustainable, price
- A green economy promotes pro-poor growth and achieves energy and resource efficiency
- A green economy has the potential to create additional jobs in the medium to long term
- The greening of most economic sectors would reduce GHG emissions significantly
- A green economy sustains and enhances ecosystem services.⁴⁵

DRAFT CARBON TAX POLICY PAPER

The draft *Carbon Tax Policy: Reducing Greenhouse Gas Emissions and Facilitating the Transition to a Green Economy* was published for comments by the National Treasury in May 2013.⁴⁶ The policy paper is a follow-up to a 2010 discussion document on the Carbon Tax Option. The 2013 policy paper followed a budget speech that announced the introduction of a 'carbon tax at the rate of R120 per tonne of CO₂ equivalent, effective from 1 January 2015'.⁴⁷ The proclamation of the draft policy paper into a White Paper as planned before the end of 2013 means that the South African government would have confirmed one of the key policy initiatives aimed at pricing carbon.

From a recent KPMG Green Tax Index tracing 21 countries, South Africa was ranked thirteenth ahead of other emerging economies of Brazil (eighteenth), Mexico (twentieth) and Russia ranked last at twenty-first.⁴⁸ China and India ranked even higher in sixth and tenth positions respectively. The Index focuses on tax incentives and disincentives that influence company activities with regard to nine green policy intervention areas namely: energy efficiency, carbon and climate change, green innovation, renewable energy and fuels, green buildings, green vehicles, water efficiency, material resource efficiency and waste management as well as pollution control and ecosystems protection.

INITIATIVES FROM THE DEPARTMENT OF ENERGY

The solid step towards moving the South African economy in the low carbon and green economy direction from the Department of Energy (DoE) began with the National Solar Water Heating Conference held on 5 November 2009. The conference, whose theme was 'Building consensus on accelerating the rollout of Solar Water Heaters in South Africa', was jointly organised with the Renewable Energy Market Transformation Unit of the DBSA.⁴⁹ During the conference the government revealed its aim to launch a massive

programme by April 2010 to substantially cut the cost of solar water heating (SWH) and accelerate rollout of at least one million units within five years. The socio-political significance of SWH in South Africa was also considered, as well as a survey on the status of SWH in the country. The Santam SWH Pilot Programme came into the spotlight and the international experience in SWH implementation was debated.

In September 2011, the DoE released the Regulations for Energy Efficiency Savings. The regulations document the Tax Allowance for Energy Efficiency Savings.⁵⁰ Any company holding a certificate that proves the energy savings are genuine is able to file the certificate with the South African Revenue Service (SARS) and claim the allowance. Through the DoE, the South African government put in place twin mechanisms for the procurement processes of renewable energy namely: the Independent Power Producer (IPP) Procurement Programme (3 625 megawatts [MWs]) and the Small Projects IPP Procurement Programme (100MWs).⁵¹ The details of the two mechanisms are shown in Box 2.1.

Box 2.1 The IPP and Small Projects IPP Procurement Programmes⁵²

The IPP Procurement Programme calls for a minimum installed capacity of 1 MW and a maximum installed capacity per technology (on-shore wind 140MW, solar photovoltaic (PV) 75MW, concentrated solar power (CSP) 100 MW, biomass 10 MW, biogas 10 MW, landfill gas 10 MW, small hydro 10 MW).

The Small Projects IPP Procurement Programme also stipulates projects which have minimum installed capacity of 1 MW and a maximum installed capacity of 5 MW. It will be a more simplistically designed procurement programme with less requirements and cheaper for bidders to participate. The intention of the DoE is to allow for the smaller players to participate in the programme.

The technologies considered as qualifying technologies for selection under the programmes are as follows with MW allocated to each Technology:

- Onshore wind – 1 850 MW
- Concentrated solar power – 200 MW
- Solar photovoltaic – 1 450 MW
- Biomass – 12,5 MW
- Biogas – 12,5 MW
- Landfill gas – 25 MW
- Small hydro – 75 MW.

The response to the call to go more green in the energy sector has gained significant momentum and the DoE has taken the lead in this regard. In November 2011, the DoE approved bids to the tune of R60 billion.⁵³ A total of 53 bids were received. In March 2012, a call for other bids equalling the same amount closed, and this would have brought up to 3 750 MW of alternative and renewable energy onto the grid forecast in the period to 2014.⁵⁴

The South African government is also looking beyond its borders in its quest for a low carbon and greener economy. On 12 November 2011, the South African government concluded a memorandum of understanding on The Grand Inga project. The Grand Inga will allow the Democratic Republic of Congo and South Africa to work together 'towards the development of strategies for low carbon economies and resilient energy systems'.⁵⁵

The development of the Grand Inga project has the potential of generating 40 000 MW when fully functional.

DBSA IN THE GREEN ECONOMY

The role of the DBSA in South Africa's transition to a low carbon and greener economy cannot be overlooked. In his editorial to the *Climate Change eDigest* of November 2011 dedicated to COP17, the CEO of the DBSA, Mr Paul Baloyi, had this to say:⁵⁶

The DBSA is honoured to have supported the Department of Environmental Affairs in preparing the National Climate Change Response Policy and the development of green economy programmes. The mainstreaming of climate resilience and low carbon emissions into South Africa's development path, sector carbon budgets and priority transitional programmes are sound building blocks that promote cohesive action across the wide range of stakeholders.

Baloyi went on to specify that the DBSA had facilitated the launch of the Drylands Fund. This is a fund that focuses on land degradation with the purpose of building resilience in marginalised communities. The Drylands Fund was set up under the auspices of the DEA with collective inputs from development partners including business, government and communities. This fund became operational in April 2011 and is housed as an agency in the bank.⁵⁷ The bank had furthermore worked with the DoE in drafting policy for the Renewable Energy Independent Power Producers Programme. A number of low carbon and green economy projects were financed by the bank during 2011. These included those drawing money from the Drylands Fund and other sources administered by the bank. A summary of these projects is shown in Table 2.3.

Table 2.3 Low carbon and green economy projects financed by the DBSA⁵⁸

Project	Location/country	Description
Drylands Fund	South Africa	Scaling up conservation and rural development with a focus on building resilience in landscapes and livelihoods
Chris Hani District Municipality	South Africa	Piloting a 'green school' programme involving use of solar and biogas energy
Kariba North Bank Extension	Zambia	Increasing the capacity of the existing hydropower plant by 360 MW from 720 MW to a total of 1 080 MW
SKEPPIES Small Grant Fund	South Africa	Providing support to projects with both development and nature conservation benefits in the succulent Karoo
Lunsemfwa Hydro Power Company Limited	Zambia	Expanding the Lunsemfwa Power Station to increase power capacity by an additional 6 megawatts from 18 MW to a total of 24 MW

The DBSA was also visible during the COP17 and organised side-events that focused on the launch of South Africa's Green Jobs Report, Development Finance Institutions Partners for Sustainable Development and Settlements Facility Climate Finance. In a press statement released jointly with the IDC, Trade and Industrial Policies Strategy (TIPS) and the DBSA, it emerged that their study on greening of the South African economy highlighted the country's great potential to create more than 460 000 new direct jobs by 2025. The Green Jobs Report estimated the creation of about 98 000 new direct jobs in the short term, 255 000 in the medium term and more than 462 000 employment opportunities in the formal economy in the long term.⁵⁹ The research considered four broad types of activities that encompassed 26 green technologies or segments:

- **Energy generation:** Pertaining to the generation of energy from sustainable, renewable and/or alternative sources with low or no carbon emissions
- **Energy and resource efficiency:** Capturing, among others, initiatives aimed at reducing energy consumption through green buildings, solar water heaters, industrial equipment and public transportation
- **Emissions and pollution mitigation:** Relating to the utilisation of technologies aimed at reducing the harmful emissions associated with highly polluting industries, including air pollution control, electric vehicles, cleaner stoves, recycling, carbon capture and storage and water treatment
- **Natural resource management:** Covering the sustainable management and restoration of natural resources, specifically water, soil and land, as well as the conservation and restoration of ecosystems.⁶⁰

The DBSA also manages an R800 million⁶¹ Green Fund allocated for a two-year period jointly with the DEA.⁶² At the time of writing, there had been two calls for proposals to be financed under the Green Fund. The first call addressed issues under three thematic areas: Green Cities and Towns, Low Carbon Economy as well as Environmental and Natural Resources Management. It attracted bids up to R10,9 billion, well in excess of the allocated R800 million in the two years. The second call focused on green economy Research and Policy Development.⁶³

POLICY STATEMENTS LEADING TO AND FROM COP17

The South African government's statement to the Second Preparatory Meeting of the United Nations Conference on Sustainable Development (UNCSD) – RIO+20 with the theme 'Focusing on the Green Economy in the Context of Sustainable Development and Poverty Eradication' indicated that there should be no one-size-fit-all prescriptive models to countries.⁶⁴ South Africa also expressed reservations concerning any form of protectionism, or conditionalities and standards that would be instituted under the guise of a green economy. Among such could be those that would generate unjustified restriction

in the areas of trade, financing and official development assistance (ODA). From a South African perspective, a low carbon and greener economy should be one that would be pro-development and enhance job creation while conserving the environment. In the statement, the country identified potential areas that would support low carbon growth to include: science, innovation and technology, strengthening of institutional capabilities and capacities as well as promotion of partnerships in developing countries.⁶⁵

During his opening address for COP17, President Jacob Zuma provided a package of insights into what South Africa had done and intended to do to move itself into low carbon gear. President Zuma indicated that the country had gone some way towards implementing the COP15 undertaking.⁶⁶ The president also spoke of the NGP framework that covered comprehensive green economy interventions. He furthermore spoke of the then most recent initiative – Green Economy Accord - and highlighted the jobs potential. The statement also discussed green economy within the Southern African context and other parts of Africa and beyond. South Africa was said to have concluded a bilateral agreement with the Democratic Republic of Congo regarding the Grand Inga Hydro Electricity Project. The plant was estimated to generate about 40 000 MW. The president also indicated that South Africa was working to generate hydro and wind energy through cooperation with the Kingdom of Lesotho. This was part of Phase 2 of the Lesotho Highland Water Project. More renewable energy projects were lined up in cooperation with Mozambique.

DEA'S GREEN INNOVATION PROJECTS

As one of the lead green economy agencies for the South African government, space is hereby devoted to profile how the DEA is putting money where its green economy mouth

Figure 2.4 Artist's view of DEA head office green building



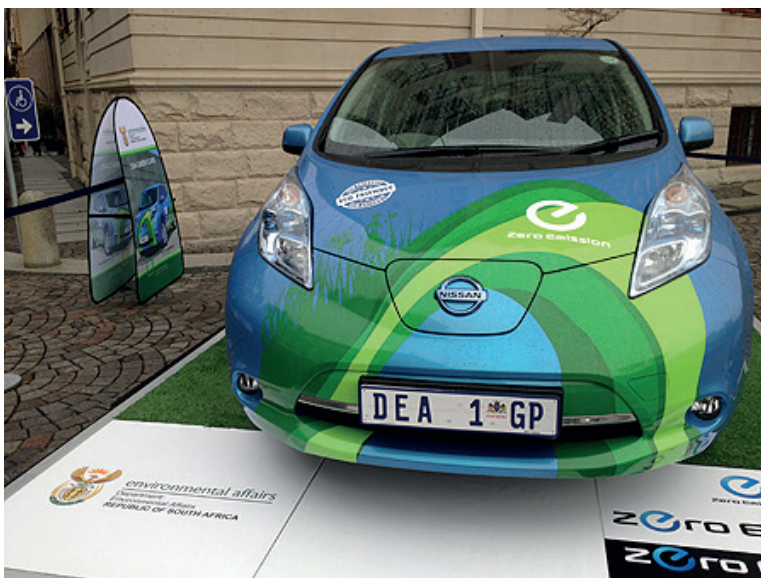
Source: DEA⁶⁸

is. Initiatives include the green buildings to accommodate the head offices in Pretoria (Figure 2.4), purchase of electric cars, video conferencing to link the Cape Town office and parliament, carbon footprint, the Green Fund and Gautrain⁶⁷ public commuting. Some of the initiatives will be discussed in the next section.

On 19 July 2012, the construction of the DEA's green building was commissioned by the Minister of Water and Environmental Affairs, Ms Edna Molewa, in Pretoria.⁶⁹ The green building is the first of its kind for the South African government and is located at the corner of Southpansberg and Steve Biko Roads in Arcadia, Pretoria. In her speech, the minister said that the green building 'should send a clear message to state-owned companies and the private sector, that government is unequivocal in its commitment to greening the way we do business and empower our people'.⁷⁰ In the building there will be direct light and ventilation. There will also be rainwater harvesting with indigenous plants decorating the building. Other key features include energy efficient lighting systems, centralised air conditioning and solar-generated power. Some targets to have the building utilise 10 per cent renewable energy and use 30 per cent less water consumption were set.⁷¹ The green building was awarded a Six-Star Green Star SA Office Design certification by the Green Buildings Council South Africa and become the first recipient in the City of Tshwane.⁷²

On 26 February 2013, the Minister of Environmental Affairs launched an initiative on electric cars, enhancing the department's philosophy to move towards zero emissions. This three-year pilot testing project, a pioneer for the government, witnesses a drive towards a fleet of zero emissions.⁷³ An initial four Nissan LEAF cars have been purchased to transport officials across the ranks (Figure 3.5).

Figure 2.5 Nissan LEAF



Source: DEA⁷⁴

The R800 million Green Fund managed jointly with the DBSA was discussed earlier. However, it is the DEA carbon footprinting exercise that is the focus here. The initiative started in 2009 and since then, two other carbon footprint reports have been produced with the 2010/2011 report now accepted as the planning baseline for the Department.⁷⁵ The carbon footprint is utilised for continuous understanding of DEA's emissions profile, to identify cost effective carbon reduction opportunities, as a planning tool, and as a model for other government departments addressing global climate change issues.

DEA has instituted the 'telecommute' pilot programme that allows appropriate managers to work from home once a week, thereby reducing their own transport carbon footprint. The video-conferencing facilities permit meetings between the Department's Pretoria, parliamentary and Cape Town offices, thus reducing the air travel-related carbon footprint. The Gautrain shuttle provides a service to DEA staff using the Gautrain as a mode of commuting to work and business at subsidised rates, thereby encouraging increased use of public transport. Lastly, the 'Green Venue' pilot attempts to use venues that, among others, practise good energy efficiency and waste management practices and facilitate easy access to Gautrain stations, etc.⁷⁶

OTHER POLICIES AND INITIATIVES TO NOTE

A number of other state-led low carbon and green economy policies and initiatives are noticeable, and include the South African Renewables Initiative (SARI), National Energy Efficiency Campaign Strategy, and the Environmental Fiscal Reform Policy Paper of April 2006. The key provisions from these policies and initiatives are summarised in Table 2.4.

Table 2.4 Summary of selected state-led green economy policies and initiatives

Initiative and/or framework	Outline
National Climate Change Response Strategy	South African government's response strategy to climate change aimed at balancing mitigation and adaptation measures as the country develops a green or low carbon economy, it is divided into these themes: • GHG emissions and limits • Build on, strengthen and/or scale up current initiatives • Implementing the BAU call for action • Preparing for the future • Respond to vulnerability and the need for adoption • Alignment, coordination and cooperation
SARI	An intra-departmental initiative to leverage international climate finance to supplement domestic funding sources, for renewable energy production linked to domestic manufacturing.

Initiative and/or framework	Outline
National Energy Efficiency Campaign Strategy	The National Energy Efficiency Strategy of 2005 sets sectoral targets for energy efficiency to be achieved by 2015. The overall target is set at 12% of final energy demand and is divided into sub-targets for the various economic sectors. The target for the industrial and mining sectors is 15%; the commercial and public buildings set at 20%, the residential sector at 10% and the transport sector at 9%. ⁷⁷
Environmental Fiscal Reform Policy Paper of April 2006	Investigates the potential for 'green taxes' in South Africa. ⁷⁸
National Skills Development Strategy III (NSDS III)	Green economy mentioned once under the Section 5.2.1 dealing with priorities under the NSDS III. The document states that skills to support the green economy should also be developed. ⁷⁹
Outcome 4 Delivery Agreement on decent employment through inclusive growth	A detailed [green economy] implementation plan will be developed after the approval of the policy and aligned with other work on energy, the environment, macro and microeconomic policies including innovation and investment plans. ⁸⁰
Outcome 10 Delivery Agreement on environmental assets and natural resources that are valued, protected and continually enhanced	Green growth contribution to economic growth and employment, while preventing environmental degradation and pollution, biodiversity loss and unsustainable natural resource use (a just transition towards a resource-efficient, low-carbon and pro-employment growth path). ⁸¹
Ten-Year Innovation Plan	South Africa is well positioned to lead research on the continent in terms of understanding and projecting changes to the physical system; the impact of these changes; and mitigation to limit their long-term effects. Mitigating climate change also provides an economic opportunity for South Africa, therefore, the country needs to develop a strategy to take advantage of the so-called 'Green Economy'.

What is evident from Table 2.4 and the description of different state policies on green economy is that the South African government departments have responded both as a united front in integrated projects, as well as individually to ensure the adoption of green economy in their planning. Moving forward, there will be need to complement actions being undertaken beyond the strategies that have been put in place in order to grow South Africa's transition to a green and low carbon economy.

THE LOCAL GOVERNMENT 'GREENSCAPE'

Local government has a developmental orientation in which it has a mandate to work in collaboration and consultation with the communities that it governs in order to advance their socio-economic interests and priorities.⁸² The main development challenges that cut across South African urban areas in general are issues concerning poverty reduction, economic development and job creation. Local government is also important because it is best placed to implement 'small scale' green economy interventions,⁸³ so it is important to

question how South African cities are planning their transition to green and low carbon economy.

As early as 2001, the City of Cape Town had put policies in place aimed at addressing environmental challenges such as the Integrated Metropolitan Environmental Plan, the Energy and Climate Change Strategy (2005) and the Framework for Adaptation to Climate Change in the City of Cape Town (2006). Within these climate change response policies and strategies are positive attributes that make the city ready for a smooth transition to a green economy.⁸⁴ For example the city's spatial planning, especially in urban design-related matters, focuses on creating more green buildings together with increased and efficient forms of cooling and heating for these, as part of the City of Cape Town's Green Building Guidelines. These guidelines will in future require that new property developments in the city make use of solar heating and in the social housing projects, retrofitting ceilings of houses has been identified as a way to maximise their heating and cooling systems. The Western Cape Provincial Government in the same light launched a Green Cape Initiative⁸⁵ in response to the NGP with one of its visions being to 'ensure that the Western Cape gets a significant share of the jobs created in the renewable and green economy'.⁸⁶

The City of Durban and its local government eThekweni Municipality have also turned the lever to open the doors to a green economy in their jurisdiction. Just as the other cities, they have placed considerable focus on developing policy documents, such as the Spatial Development Framework (2002), Economic Development Strategy (2008), the Integrated Development Plan (2009) which is reviewed annually, Imagine Durban (2009), Integrated Transport Plan 2010–2015, and other strategic plans aimed at transition to green and low carbon economy. The Integrated Development Plan of 2009, for example, has low carbon principles especially in the areas of increasing city densities and related improvements to the transport system.⁸⁷ The city has also managed to set up an energy office that is strategically positioned to report to the Treasury Department. A 2011 report by the Academy of Science of South Africa (ASSAf) commends eThekweni's water and sanitation (viz, eThekweni Water and Sanitation and Umgeni Water Master Plans) as having been particularly innovative in implementing projects that aim to reduce water demand and generate electricity.⁸⁸ However, the report argues that in some instances 'there is a disjuncture between the eThekweni Transport Authority's policy documents and the reality on the ground'.⁸⁹ Table 2.5 summarises the 'Imagine Durban' initiative and its themes.

Table 2.5 Relevant themes and strategies of 'Imagine Durban'

Theme	Strategies
Promoting an accessible city	Develop high density nodes and corridors. Promote and encourage the provision and use of public transport. Support development of non-motorised public transport. Ensure equitable location of non-motorised public transport. Ensure universal access to facilities and public transport. Ensure access to housing and household services.
Creating a prosperous city where all enjoy sustainable livelihoods	Enhance livelihood choices and prospects of citizens, especially the poor. Food Production.
Ensuring a more environmentally sustainable city	Incentives and disincentives to ensure more sustainable practice. Information and education. Integrated waste management systems. Pollution preservation. Water conservation. Energy efficiency. Alternative energy production. Climate change prevention and preparedness. Productive ecosystems.

Source: ASSA⁹⁰

Furthermore, the KwaZulu-Natal Province's Department of Economic Development and Tourism commissioned research in collaboration with University of KwaZulu-Natal's School of Development studies in order to be informed on how to shift towards a green economy.⁹¹

The Gauteng Province is an important region in shaping South Africa's green economy panorama. Among some of its challenges are: the increasing food insecurity, as Gauteng is very dependent on food grown outside its borders; water scarcity and poor quality due to contamination of water sources and high levels of poverty; and inequality, unemployment and illiteracy.⁹² The Strategic Agenda for the province states that 'over the next 15 years, the Gauteng Provincial Government will design, manage and implement a systematic programme aimed at building a low carbon, resource-productive economy that creates new "green" jobs and reduces environmental impacts'.⁹³ Through its Department of Economic Development the provincial government financial resources have been allocated to pursue interventions in the following areas:

- **Food security:** Reducing food imports and (vastly) increasing local food production
- **Energy security:** Reducing dependence on oil- and coal-based sources of energy by increasing the supply of renewable energy and improving energy efficiency
- **Water security:** Reducing total water consumption by 15% by improving efficiencies, introducing recycling, increased public education, and reversing pollution

via more effective management of Gauteng's water resources and associated ecosystem services

- **Zero waste:** By seeing all waste outputs as potential productive inputs, measures will be introduced to reduce, recycle and re-use
- **Sustainable mobility:** Reducing dependence on oil and limit carbon emissions, so that investments in public transport systems will be accelerated so that the number of trips in private vehicles can be reduced by 15%.⁹⁴

The three metropolitan areas of Gauteng – Ekurhuleni, Tshwane and Johannesburg – will eventually have to work and plan in accordance with the province's green strategy. They also have strategies and policy positions regarding low carbon and green economy transition in their jurisdictions. Ekurhuleni's Growth and Development Strategy 2025, which was formulated in 2005, does not directly speak of green economy growth and strategies but does insinuate a number of measures that speak to low carbon emission. For example, the city has a target to reduce travel times and the travel distances of commuters by between 10 per cent and 15 per cent by 2025, which will result in a reduction of air pollution. The City of Tshwane, which is the largest metropolitan municipality in the province and the country, has also committed to prioritise the green economy, particularly alternative and renewable energies as well as green building regulations.⁹⁵

The City of Johannesburg has refined its Growth and Development Strategy of 2006 with a new draft developed in August 2011 and subsequently circulated for comments by stakeholders. One of the six principles is dedicated to 'ensuring resource security and environmental sustainability'⁹⁶ in which a number of projects are underlined, for example the development of green infrastructures such as smart metering systems to improve demand side management. At present, the city has made strides in green transport systems through which considerable reduction in carbon emissions are envisaged, i.e. the Gautrain and the *Rea Vaya* Bus Rapid Transit System (BRT) which currently transports an average of 30 000 commuters a day.⁹⁷

Further north of Gauteng is the Limpopo Province, which is largely rural in character and whose major economic sectors are mining, tourism and agriculture, all of which are dependent on the local resources. As a predominantly rural province, the most pressing problem is the absence of sustained growth and the creation of jobs that are expected to reduce poverty and improve livelihoods.⁹⁸ The Limpopo Provincial Government's Green Economy Plan (LGEP) envisages a green economy in agriculture, construction, manufacturing, installation, science and technology, and in the service sector. Pivotal to the LGEP's emerging green economy is the need to provide for its largely rural and marginalised communities. Agriculture and energy sectors are among the most strategic sectors expected to contribute to job creation and poverty alleviation, provide service to communities and promote rural development.⁹⁹ The province positively views South Africa's ratification and belonging to the International Renewable Energy Agency (IRENA) fraternity

and community as an initiative that can culminate in the sustainable development of the Limpopo Green Economy Initiative.¹⁰⁰

The Nelson Mandela Bay Municipality (NMBM) in Port Elizabeth, through its Go Green¹⁰¹ campaign, shows commitment towards greening its environment and pursuing economic growth in a sustainable manner. The city's Public Transport Plan will create milestones in providing 'an efficient, safe, affordable, sustainable and accessible multi-modal public transport system that supports social and economic development to ensure optimal mobility and improved quality of life for the residents and users of the transport system in the metropolitan area'.¹⁰² The plan will see NMBM joining other metropolitan areas in the launching of cleaner public transport systems such as the BRT initiative. In the renewable energy arena, the city has embarked an exercise of installing 1 200 solar water heaters in homes as part of the *Zanemvula* Housing Project.¹⁰³

VOLUNTARY INITIATIVES AND GREEN ECONOMY LANDSCAPE

From a voluntary perspective, there are several green economy initiatives being championed by the private sector and civil society in South Africa. Already business plays a crucial role, through National Business Initiatives (NBI) and Business Unity South Africa, in making submissions to draft policies on climate change and green economy when they are tabled for public comment. Business embraces the need to explore opportunities that will be derived from transitioning to low carbon and green economy:

From a business perspective, this includes thorough audits of resource consumption, greenhouse gas emissions and potential for promoting resource efficiency in goods and services and finding solutions to negative impacts on ecosystem services. It will also require longer-term projections and improved integration of planning, operational performance and integrated reporting where the cost of natural capital and physical and reputational risks are given a financial value.¹⁰⁴

In the same light there have been positive responses from business and civil society, such as the CDP, CDP Water, Energy Efficiency Accord, JSE SRI, King III (incorporating Integrated Reporting) and other initiatives. This section documents these and other voluntary initiatives in the South African green economy landscape.

THE CARBON DISCLOSURE PROJECT (CDP) AND CDP WATER

The CDP was established in 2000 with the aim to accelerate solutions to climate change by putting relevant information at the heart of business, policy and investment decisions. The initiative started in the United Kingdom (UK). In South Africa, the CDP was launched in 2007¹⁰⁵ and businesses who participate in this initiative report annually since then.

The Johannesburg Stock Exchange (JSE) Top 100 list is used as the identified sample of reporting organisations, which are identified on the basis of market capitalisation. According to the CDP Report (2010) the reporting 'has challenged the world's largest companies to measure and disclose their carbon emissions'.¹⁰⁶ The CDP questionnaire contains information disclosing emissions performance, which includes emissions reduction targets and energy use, it also assesses companies' wider performance by requiring disclosure on the management of climate change; as well as the risks and opportunities surrounding climate change.¹⁰⁷

An underlying objective of the CDP is to review and assess the action and disclosure of companies and sectors against what is seen as a best-practice response to the challenges of climate change.¹⁰⁸ In line with what are seen to be the key elements of an effective climate change strategy, the CDP questionnaire focuses on four key areas of corporate climate change management: (1) risks and opportunities; (2) GHG emissions accounting; (3) performance; and (4) governance. These questions provide companies with an opportunity to identify the strengths and current limitations in different aspects of their management of climate change-related issues.

The CDP Water was instituted for the first time in South Africa in 2010 following requests at a global level for companies to develop a measurement and reporting platform for water. Being a water-stressed country, South Africa's companies are among the stakeholders who should report voluntarily on their water strategies and management plans, on their water-related risks and opportunities, and on their water use within the context of local scarcity or abundance.¹⁰⁹ Six of the companies listed on the JSE from CDP's global target of 302 companies worldwide participated in the 2010 survey and another six South African companies responded on a purely voluntary basis bringing the total to 12.¹¹⁰ The CDP Report acknowledges the participation on voluntary basis of the other six as evidence that South Africa takes the matter seriously.¹¹¹ It should be noted that this pioneering venture by the CDP and South Africa's NBI has been a relatively successful channel through which companies in the country can become more responsible and move towards abandoning the unsustainable BAU model.

KING III REPORT (INTEGRATED REPORTING)

The King III Report was issued on 1 September 2009 following the changes in the Companies Act of South Africa in 2008, and one of the key developments in this report is Integrated Reporting.¹¹² The responsibility of integrated reporting rests with an organisation's board that may assign the overseeing of sustainability issues in the integrated report to the relevant audit committee. The audit committee should ensure that there is reliable information in the integrated report and that there will be no conflict or differences with the financial statements. In drafting the King III, a realisation came that 'a company of the 21st Century experiences business unusual, and needs to make more with

less, thinks of alternative energy, must reduce its carbon footprint and should realise that governance, strategy and sustainability are inseparable'.¹¹³

King III was integrated into the JSE listing requirements in February 2010, making it compulsory for listing companies to comply with the King III provisions. The year 2010 witnessed South African business moving swiftly towards Integrated Reporting as the JSE listing requires companies to comply with this direction as of 1 March 2010.¹¹⁴ The proponent and pioneer of Integrated Reporting, Professor Mervyn King, believes the concept is an idea whose time has come to its fullness due to a multiplicity of crises of our generation namely: the global financial meltdown, climate change and ecological overshoot.¹¹⁵

The framework for Integrated Reporting is supported by industry heavyweights and professional bodies that include: the Association for Savings & Investment South Africa (ASISA); the Banking Association South Africa (BASA); Business Unity South Africa (BUSA); Chartered Secretaries Southern Africa (CSSA); Institute of Directors in Southern Africa (IoDSA); JSE; and the South African Institute of Chartered Accountants (SAICA). The 400 JSE listed companies will be working their way into understanding and reporting on the proposed framework. In integrated reporting, companies are not expected to simply compile a single annual performance report attaching the sustainability report to the financial report. Rather, companies are expected to focus on long-term horizons that consider the nexus of the traditional pillars of sustainability – social, economic and environmental.

CLIMATE CHANGE CRITERIA ON THE JSE SRI

Launched in 2010, the JSE Social Responsible Investment (SRI) incorporated climate change in its evaluation criteria for the SRI constituency. The climate change criteria are put into the three subdivisions, namely: policy, management and strategy, and disclosure.¹¹⁶ For a start, the JSE SRI set minimum requirements for the climate change category that included requirements for a company to demonstrate evidence with regards to senior responsibility for climate change and commitment to climate change. For a company to be recognised in the JSE SRI index as a best performer, it had to provide evidence linked to all relevant indicators associated with the climate change criteria. The inclusion of climate change as one of the criteria means more and more companies listed on the JSE SRI are forced to adopt a green economy agenda.

CONCLUSION

This chapter attempted an ambitious goal to map out the green economy landscape of South Africa. It is ambitious in the sense that from the first insinuations about green economy by politicians to legislated green economy policies, as well as white papers and other draft

papers, there have been numerous developments - some of which have gone unreported, and all of which have a bearing on the country's green economy growth trajectory. Mapping these developments in a chronological manner has similarly not been easy. More importantly, the mammoth task is that of identifying and mapping the green economy facets from the private and civil society sectors, for they are difficult to measure in terms of magnitude, impact, among other crucial factors. Nevertheless we believe we have tried to capture all those different aspects and it is becoming apparent that green economy rhetoric has transformed into action over the years in South Africa. With this background in mind, we tried to reveal the reasons triggering corporate South Africa into a green economy transition drive.

The chapter has demonstrated the various aspects that shape the country's green economy landscape. One is the national government's policy instruments which have been crafted to carve the niche areas of green economy, among them the NSSD1, the NGP, the IPAP2 and the MTSF. All these policies and position statements demonstrate how the South African government has positioned itself to play a strategic role in the country's transition process towards a green and low carbon economy.

Green economy action is coordinated through the economic sectors and employment cluster where key national departments are represented and report their sector progress. Apart from national government departments, the provincial governments have also adopted the green economy growth trajectory in their local economic development plans through localising green initiatives. The provinces also use their relevant economic clusters to engage on green economy. The intergovernmental structures such as MINMEC (Minister and MECs) allow national and provincial governments to engage on green economy action. Since the outcomes approach, some of the MINMEC structures like MINMEC Environment are expanded to include local governments as members, in particular the cities. With such command and control policies by government, the private and civil society actors have also been pre-occupied with aligning themselves to the requirements of a green economy. As already highlighted, South African JSE Top 100 companies have participated in the NBI's CDP, which set a precedent for responsible reporting and behaviour that leans towards abandonment of the business as usual model. A combination of all these green economy drives from both public and private sectors gives South Africa a 'panoramic green economy landscape'.

NOTES AND REFERENCES

- 1 Keynote address by His Excellency, Mr Jacob Zuma, President of the Republic of South Africa, at the 2010 Green Economy Summit, Sandton Convention Centre, Johannesburg.
- 2 United Nations Environment Programme (UNEP), 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers. Available at http://www.unep.org/greeneconomy/portals/88/documents/ger/GER_synthesis_en.pdf. [Accessed 19 November 2013].

- 3 Department of Environmental Affairs (DEA), 2011. National Strategy for Sustainable Development. Pretoria: DEA. pp. 3–5.
- 4 Simmons, B., 2010. Green Economy Context and Definition. Presentation at the Green Economy Initiative: Global Major Groups and Stakeholders Forum. UNEP – Green Economy Initiative. Available at <http://www.unep.org/civil-society/LinkClick.aspx?fileticket=MO1JM6CTZao=&tabid=3343&language=en-US>. [Accessed 11 October 2011].
- 5 Simmons, B., 2010. Op Cit.
- 6 DEA., 2010. Green Economy Summit Report. 18–22 May 2010. p. 4. Available at http://www.environment.gov.za/greeneconomy_summit/docs/summitreport.pdf [Accessed 19 November 2013].
- 7 Ibid.
- 8 Davies, R., 2011. South Africa's Industrial Policy Action Plan (IPAP2) and African Development. Presentation at the African Renaissance Conference, 4 August 2011.
- 9 Ibid.
- 10 Government of South Africa., 2009. Framework for South Africa's response to the international economic crisis. Available at <http://www.info.gov.za/view/DownloadFileAction?id=96381> [Accessed 19 November 2013].
- 11 Kabane. N., 2011. Climate Change: Municipal Responses. Available at <http://www.afesis.org.za/Local-Governance-Articles/climate-change-municipal-responses-by-noxolo-kabane> [Accessed 10 October 2011].
- 12 DEA., 2011. Op Cit. p. 7.
- 13 DEA., 2010. Op Cit.
- 14 DEA., 2011. Op Cit.
- 15 Department of Environmental Affairs and Tourism (DEAT), 2007. Long-Term Mitigation Scenarios: Technical Summary. Pretoria: Department of Environmental Affairs and Tourism.
- 16 Figure supplied by Harald Winkler of the Energy Research Centre, University of Cape Town through personal communication on 24 October 2011 as published by Winkler, H., 2010. Taking action on climate change: Long-term mitigation scenarios for South Africa. Cape Town: UCT Press.
- 17 Gordhan, P., 2011. Medium-Term Budget Policy Statement 2011. Pretoria: National Treasury.
- 18 Ibid.
- 19 Economic Development Department., 2010. The New Growth Path: The Framework.
- 20 Ibid. p. 18.
- 21 Ibid, p. 12.
- 22 Ibid.
- 23 Department of Trade and Industry (DTI). The Industrial Policy and Action Plan 2 2010/11 – 2012/13. Available at <http://www.info.gov.za/view/DownloadFileAction?id=117330> [Accessed 12 October 2011].
- 24 Ibid.
- 25 The Presidency., 2009. Together Doing More and Better Medium Term Strategic Framework: A Framework To Guide Government's Programme In The Electoral Mandate Period (2009–2014).
- 26 Ibid.
- 27 Government of South Africa., 2011. South Africans sign Accord to inject billions into green economy. Available at <http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=23295&tid=49268> [Accessed 12 January 2012].
- 28 Ibid.
- 29 Ibid.

Chapter 2

- 30 Ibid.
- 31 National Planning Commission., 2011. National Development Plan: Vision for 2030. Pretoria: National Planning Commission.
- 32 Ibid, p. 179.
- 33 Ibid, p.179.
- 34 Hassen, E. The National Development Plan will end poverty in South Africa by 2030 –Really? The South African Civil Society Information Service. Available at <http://www.sacsis.org.za/site/article/785.1> [Accessed 22 January 2012].
- 35 Fakir, S., 2011. South Africa: The National Development Plan – a Low Carbon Vision Steeped in Contradiction, The South African Civil Society Information Service. Available at <http://www.sacsis.org.za/site/article/784.1> [Accessed 19 November 2013].
- 36 DEA., 2011. National Climate Change Response White Paper. Available at http://www.environment.gov.za/PolLeg/WhitePapers/national_climatechange_response_whitepaper.pdf [Accessed 20 March 2012].
- 37 Molewa, B., 2011. Budget Vote speech for the Department of Environmental Affairs by the Minister of Water and Environmental Affairs, Minister Bee Molewa, in the National Assembly, Parliament, 20 April 2011. Available at <http://www.pmg.org.za/briefing/20110420-environmental-affairs-ministers-budget-speech> [Accessed 30 March 2012].
- 38 Ibid.
- 39 DEA., 2012. Concept Paper: Green Economy Modelling. Pretoria: DEA.
- 40 DEA., 2011. Op Cit.
- 41 Figure supplied by the Millennium Institute on 3 February 2012.
- 42 DEA., 2012. Green economy modelling workshop outcomes report. February 2012. Report was circulated to the participants.
- 43 UNEP., 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. pp. 500–503.
- 44 Key note address by Dr Edward Sambili, CBS Permanent Secretary Ministry of State for Planning, National Development and Vision 2030 during the T21 systems dynamic modelling stakeholders workshop. Laico Regency Hotel, Nairobi, 8 July 2011. Available at http://www.planning.go.ke/index.php?option=com_content&view=article&id=313:the-t21-systems-dynamic-modelling-stakeholders-workshop-laico-regency-hotel-nairobi-8th-july-2011&catid=55:permanent-secretary&Itemid=95 [Accessed 5 December 2011].
- 45 UNEP., 2011. Op Cit. pp. 500–503.
- 46 National Treasury., 2013. Carbon Tax Policy: Reducing Greenhouse Gas Emissions and Facilitating the Transition to a Green Economy. Pretoria: National Treasury.
- 47 Gordhan, P., 2013. Budget Speech. Cape Town: National Treasury.
- 48 KPMG., 2013. KPMG Green Tax Index. London: KPMG.
- 49 Department of Energy (DoE),. 2009. The National Solar Water Heating Conference. Pretoria: DoE.
- 50 DoE., 2011. Regulations for Energy Efficiency Savings. Pretoria: DoE.
- 51 DoE., 2011. Fact Sheet for the Media Briefing Session on 31 August 2011 Re: the Renewable Energy Independent Power Producer (IPP) Programme. Pretoria: DoE.
- 52 Ibid.
- 53 As of February 2012, the exchange rate was averaging US\$1 to R7,80.
- 54 Fisher-French, M., 2012. R120 billion clean power boom. Available at <http://mg.co.za/article/2012-01-27-r120bn-clean-power-boom/> [Accessed 3 February 2012].

- 55 DoE., 2011. Statement by Minister Peters, on the Occasion of the Signing Ceremony of the Grand Inga Project MOU between the Republic of South Africa and the Democratic Republic of the Congo in Lubumbashi, DRC. Pretoria: DoE. p. 1.
- 56 Baloyi, P., 2011. Chief Executive's Message. Climate Change eDigest, (2ed). p. 1.
- 57 Development Bank of Southern Africa (DBSA). Drylands Fund. Johannesburg: DBSA.
- 58 Baloyi, P., 2011. Op Cit. p. 23.
- 59 DBSA/TIPS/IDC., 2011. Green Jobs report – press release. Available at [http://www.dbsa.org/\(S\(k4psat555axufz2ferinqn55\)\)/news/latestnews/Pages/GreenJobsreport.aspx](http://www.dbsa.org/(S(k4psat555axufz2ferinqn55))/news/latestnews/Pages/GreenJobsreport.aspx)[Accessed 2 February 2012].
- 60 Ibid.
- 61 The exchange rate averaged US\$1 to R9 in the second quarter of 2013.
- 62 Green Fund., 2013. Green Fund receives R10.9 billion worth of project application. Pretoria: Green Fund.
- 63 Green Fund., 2013. Green Fund opens research and policy development window. Pretoria: Green Fund.
- 64 Government of South Africa., 2011. South Africa's Statement to the Second Preparatory Meeting of the United Nations Conference on Sustainable Development (UNCSD) – RIO+20: Green Economy in the context of Sustainable Development and Poverty Eradication, 7 March 2011, New York.
- 65 Ibid.
- 66 Zuma, J., 2011. Address by His Excellency President Jacob Zuma at the official opening of COP17/CMP7, Inkosi Albert Luthuli International Convention Centre, Durban. Available at <http://www.cop17-cmp-7durban.com/en/news-centre/speeches/south-african-president-zuma-opening-address.html> [Accessed 20 January 2012].
- 67 Gautrain is a high speed train service linking Pretoria, Johannesburg and the OR Tambo International Airport.
- 68 DEA., 2013. 2013/14 DEA Budget Vote and Green Cars Exhibition. https://www.environment.gov.za/content/gallery/budgetvote_greencarsexhibition?picture=639#640 [Accessed 5 June 2013].
- 69 Engelbrecht, L., 2012. A green building for a green department. Bojanala (June–July 2012). pp. 3–8.
- 70 Ibid, p.4.
- 71 Ibid.
- 72 DEA., 2013.6 Green Stars to Shine at Environmental Affairs head office. Available at https://www.environment.gov.za/6greenstars_shine_atenvironmentalaffairs [Accessed 5 June 2013].
- 73 Engelbrecht, L., 2013. Environmental Affairs leads the drive towards zero emissions. Environment Quarterly. pp. 4–6. Pretoria: DEA.
- 74 DEA., 2013. 2013/14 DEA Budget Vote and Green Cars Exhibition. Available at https://www.environment.gov.za/content/gallery/budgetvote_greencarsexhibition?picture=639#648 [Accessed 5 June 2013].
- 75 DEA., 2011. Carbon footprint report for the DEA. Pretoria: DEA.
- 76 Lukey, P., 2013. The Department's climate change response and general green economy initiatives. Email communication dated 6 June 2013. Pretoria: DEA.
- 77 DoE., 2011. Draft Strategy For The Energy Efficiency Campaign. Pretoria: Department of Energy.
- 78 National Treasury., 2006. Draft Environmental Fiscal Reform Policy Paper. April 2006. Pretoria: National Treasury.
- 79 Department of Higher Education and Training (DHET)., 2010. National Skills Development Strategy III. Pretoria: Department of Higher Education and training.
- 80 South African Government., 2010. Outcome 4 Delivery Agreement on decent employment through inclusive growth. Available at <http://www.thepresidency.gov.za/MediaLib/Downloads/Home/>

Ministries/DepartmentofPerformanceMonitoringandEvaluation3/TheOutcomesApproach/Delivery%20Agreement%20-%20Outcome%204.pdf [Accessed on 30 March 2012].

81 Ibid.

82 Kabane, N., 2011. Climate Change: Municipal Responses. Available at <http://www.afesis.org.za/index.php/local-governance/93-local-governance-articles/1028-climate-change-municipal-responses-by-noxolo-kabane> [Accessed 19 November 2013].

83 DEA., 2010. Concept Paper: Towards a Green Economy Summit. Pretoria: Department of Environmental Affairs. p. 5.

84 Kabane, N., 2011. Op Cit.

85 Provincial Government of the Western Cape, Department of Economic Development and Tourism., 2010. Green Cape Initiative, Presented at the Green Economy and Renewable Energy Conference. Available at <http://www.green-cape.co.za> [Accessed 5 November 2010].

86 Provincial Government of the Western Cape., 2010.

87 Academy of Science of South Africa (ASSAf)., 2011. Towards a Low Carbon City: Focus on Durban. Pretoria: ASSAf. p. 55.

88 Ibid.

89 Ibid.

90 Ibid.

91 Mahomed, N. and Beires, L., 2011. Unlocking the KwaZulu-Natal Green Economy: Executive Summary. KZN Department of Economic Development and Tourism and University of KwaZulu Natal, School of Development Studies. Futureworks and Eco-futures.

92 Gauteng City Region Observatory., 2010. A strategy for a developmental green economy for Gauteng. Report prepared for the Gauteng Province Department of Economic Development. p. 6.

93 Ibid.

94 Ibid.

95 City of Tshwane., 2011. Local Economic Development: A User information Guide. Pretoria: City of Tshwane.

96 City of Johannesburg., 2011. Growth and Development Strategy (Draft for consultation). Johannesburg: City of Johannesburg.

97 Its main target is to place 85% of the City's population within a 500 kilometres of a BRT feeder or trunk route. Available at <http://www.ssatp.org/sites/ssatp/files/publications/Toolkits/ITS%20Toolkit%20content/case-studies/johannesburg-south-africa.html> [Accessed 19 November 2013].

98 Musyoki A., 2011. Emerging Policy, Plans and Programmes Towards a Green Economy and Social Development in Limpopo Province, South Africa. Paper presented at the UNRISD conference: Green Economy and Sustainable Development: Bringing Back the Social Dimension 10–11 October 2011. Geneva. p. 7.

99 Ibid, p.8.

100 Limpopo Employment Growth and Development Plan (LEGDP)., 2009–2014 Document (3). p. 73.

101 Nelson Mandela Bay Municipality. 2013. Energy efficiency projects. Available at <http://www.nelson-mandelabay.gov.za/Content.aspx?objID=412> [Accessed 19 November 2013].

102 Nelson Mandela Bay Municipality., 2011. Public Transport Plan. Available at <http://www.nelsonmandelabay.gov.za/Content.aspx?objID=334> [Accessed 19 November 2013].

103 Kabane, N., 2011. Op Cit.

- 104 World Business Council for Sustainable Development., 2010. South Africa launches green economy road maps. <http://www.wbcsd.org> [Accessed 11 January 2011].
- 105 National Business Initiative (NBI)., 2009. Carbon Disclosure Project 2009 South Africa JSE 100. Johannesburg: NBI & Incite Sustainability.
- 106 KPMG., 2010. South Africa's Carbon Chasm – Based on Carbon Disclosure Project 2010 responses from the JSE 100 Companies. Johannesburg: KPMG. p. 8.
- 107 Ibid.
- 108 Carbon Disclosure Project (CDP)., 2000. Carbon Disclosure Project Global 500. London: CDP.
- 109 Carbon Disclosure Project., 2010. CDP Water Disclosure 2010 South Africa Focus. p. 2.
- 110 Companies from Target Sample are Anglo American, Anglo Platinum, Anglo Gold Ashanti, British American Tobacco, SABMiller and Sasol; and Volunteers are Eskom, Exxaro Resources, Impala Platinum, Nedbank, Northam Platinum and Woolworths Holdings.
- 111 Carbon Disclosure Project., 2000. Op Cit. p. 4.
- 112 Price Waterhouse Coopers., 2009. King III at a Glance. Johannesburg: Price Waterhouse Coopers.
- 113 King, M., 2010. The New South African Companies Act and King III: The Future. Pretoria: Mek Corporate Legal Advisers.
- 114 Johannesburg stock Exchange (JSE)., 2011. King Unveils World-class Integrated Reporting Guidelines. Sandton: Johannesburg Stock Exchange.
- 115 Ibid.
- 116 JSE SRI., 2010. Background and selection criteria. Available at http://www.jse.co.za/Libraries/SRI_Criteria_Documents/01_Background_and_criteria_2010.sflb.ashx [Accessed 20 October 2011].

3

Third alternative to industrial development

Role of the NCPC in resource efficiency and cleaner production in South Africa

Marié Uys and Sunette Steyn

ABSTRACT

The primary objective of this case study of the National Cleaner Production Centre of South Africa (NCPC-SA) was to establish what the NCPC-SA considered as its breakthrough intervention in the green economy. Consequently, the NCPC-SA's role in and contribution to environmental sustainability, a greener economy and cleaner production (CP) was considered. It emerged that the NCPC-SA and its focus on resource efficiency and cleaner production within SMEs was the major breakthrough. Although challenges still exist with regard to the slow implementation of initiatives and recommendations from the NCPC-SA by the Small and Medium-size Enterprises (SMEs) and other companies, success is being realised. This is showcased by the 61 production facility sites assessed by the NCPC-SA between April 2010 and March 2011.

INTRODUCTION

The case study of the NCPC-SA is unique in that it profiles a green economy breakthrough from a national statutory body. The NCPC-SA is advocating for and enabling resource efficiency and CP in South Africa in line with global developments in this space. In 1992 the United Nations Conference on Environment and Development (UNCED), also known as the Rio Conference, was held in Rio de Janeiro. After the Rio Conference, the United Nations Industrial Development Organisation (UNIDO) and the United Nations Environment Programme (UNEP) initiated resource-efficient and CP pilot projects in order to demonstrate preventive environmental strategies.¹ Upon the successful completion of these pilot projects, the partners agreed to sustain such production by establishing national capacities known as NCPCs in developing countries and economies in

transition.² In South Africa, the NCPC-SA was established during the 2002 World Summit for Sustainable Development that took place in Johannesburg.³

The establishment of the NCPC-SA was a product of international competitive pressures for greener economies, environmental technical barriers to trade, as well as cost and resource availability challenges.⁴ The cooperation programme between UNIDO, South Africa's national Department of Trade and Industry (DTI), the Council for Scientific and Industrial Research (CSIR) and the donor countries, Austria and Switzerland⁵ brought about the initial establishment of the NCPC-SA. Today the NCPC-SA is fully funded by the National Treasury through the DTI and it serves as the key industrial sustainability programme of the DTI.⁶ The NCPC-SA focuses on SMEs. It is hosted within the legal facilities, financial and human capital structures of the Council for Scientific and Industrial Research (CSIR) and is dependent on the CSIR for its business process system in relation to human resources, information and communications technology, legal services and financial management.⁷

The primary aim of the NCPC-SA is to assist companies to reduce their use of energy, water and other natural resources while also reducing the generation of waste and emissions.⁸ In order to do so, the NCPC-SA carries out CP assessments and supports the implementation of CP activities.⁹ It promotes Environmentally Sustainable Technologies (ESTs) and investments, raises public awareness and contributes to policy development.¹⁰ The CP initiative aims to assist the industrial sectors of developing countries to produce in a sustainable manner, thus improving their competitive position.¹¹

RESOURCE EFFICIENCY AND CLEANER PRODUCTION

According to UNEP, CP can be defined as the continuous application of an integrated preventive environmental strategy applied to processes, goods and services to increase overall efficiency and reduce risks to humans and the environment.¹² CP can also be defined as a systematically organised approach to production activities, which has positive effects on the environment.¹³ These activities encompass resource use minimisation, improved eco-efficiency and source reduction to improve the environmental protection and to reduce risks to living organisms.¹⁴ While these definitions adequately describe the concept of CP, more clarification is needed in order to unpack the concept.

While many current environmental protection initiatives focus on what to do with waste and emissions that already exist, CP is a positive and proactive approach to improve the environment.¹⁵ CP promotes the prevention of the generation of pollution and brings about more efficient use of resources.¹⁶ The idea behind the promotion of CP is that waste avoidance and reduction should be considered as the first options but if waste cannot be avoided, the quantities should be kept to a minimum and options for recovery, re-use and recycling should be brought into consideration before treatment and disposal options are considered.¹⁷

According to UNEP, which defines resource efficiency from a lifecycle and value chain perspective, the total environmental impact of the production and consumption of goods and services, from raw material extraction to final use and disposal, should be reduced.¹⁸ Resource efficiency works to ensure that natural resources are produced, processed and consumed in a more environmentally sustainable way, paving the way to a green economy.¹⁹

Resource efficiency and cleaner production (RECP) builds on CP by accelerating the application of preventative environmental strategies, such as avoiding waste from processes, goods and services. It increases the efficiency and competitiveness of companies by addressing the three sustainability dimensions namely: (1) production efficiency and competitiveness (2) environmental management (3) human development.²⁰ Here are some brief explanations of each of the dimensions:

- **Production efficiency and competitiveness:** Optimising the productive use of natural resources (materials, energy and water)
- **Environmental management:** Minimising the impact on the environment and nature through reduction of waste and emissions
- **Human development:** Minimising the risk to people and communities and offering support for their development.

Hence, RECP has the potential to enhance the competitive capacities and productive capacity of corporates and, consequently, safeguard jobs through the efficient utilisation of energy, water and material resources. This is done while contributing to the ecological sustainability of industry.²¹

In order to achieve a resource-efficient industry in South Africa, a shift from unsustainable consumption and production patterns to a significant transition in energy, industrial, agricultural and transport systems as well as behavioural changes amongst both producers and consumers is needed.²² To ensure a successful integration of CP concepts and technologies into businesses and industries, professionals in those industries need adequate training and knowledge.²³ RECP provides businesses with the opportunity to reduce costs and improve productivity by identifying cost-saving options that would reduce resource consumption and thus enhance future competitive capabilities.²⁴ CP also involves simple strategies ranging from good housekeeping to more technology-driven strategies such as new product or process design and technology transfer.²⁵ This is a holistic and integrated approach to environmental protection because it addresses the challenges of sustainable development at several levels,²⁶ as described in Table 3.1.

Table 3.1 Different strategies for CP

Strategy	Description
Good housekeeping	Good housekeeping measures are procedural, administrative or institutional measures that a company can adopt with a view to preventing waste and emissions. They are mainly based on the human effort in the production process and can often be introduced with little cost.
Technological changes	Technological changes are orientated towards production processes and installation changes to reduce waste and emissions. They range from minor changes that can be implemented in the short term and at low cost to the complete change-over to other production processes involving large investments.
Changes in raw materials	Waste and emission prevention is achieved by making changes to the input materials in such a way that substances leading to the formation of waste and generation of emissions are either not used at all or used to a lesser degree. Raw material changes include material purification or material substitution.
Product changes	Product changes can be performed by the manufacturer of a product with the intention of reducing waste from a product's use. Product changes include: product substitution, product conservation or changes in product composition. Product changes include packaging and may be one of the most important prevention techniques that can be applied by industry and commerce to prevent generation of litter.
On-site and off-site re-use	Re-use occurs when a waste stream is either re-used as raw material in the originating process on-site or in another process off-site.

Source: Compiled by author²⁷

From the literature analysis presented in the preceding paragraphs, it follows that both scholars and practitioners present strong arguments in favour of RECP. The case for RECP was also supported by the director of the NCPC-SA. The director gave three reasons why companies support RECP. The first reason was the growing concern around the world regarding climate change and its impact on the environment. The director further stated that the legislative framework of South Africa was becoming more rigorous and that companies were preparing to adapt their practices in order to comply with the new legislation. When considering the recent policy developments on climate change in South Africa, including the National Climate Change Response Green Paper and the Carbon Tax Discussion Paper, published in 2010 by the Department of Environmental Affairs (DEA) and the National Treasury respectively,²⁸ it appears that this statement was accurate. The implication is that companies are ensuring that they operate within the legal framework. The majority of businesses' concern with the environment lies in complying with the law rather than incorporating CP and sustainability into their operations.²⁹

The second reason related to the pressures exerted by consumers, nationally and internationally. Companies realised that they would be unable to supply to a number of markets unless they met certain quality standards or maintained certain greenhouse gas (GHG)

footprint management standards. Businesses realised that if they did not adhere to or fulfil certain requirements and standards, there would be a limited market for their product.

The third reason related to the concerns companies had about the current energy trends around the world. The director explained this by using an example: 'There are companies in South Africa which we have serviced, where a large percentage, almost 50%, of their production input is energy costs, so they want to reduce that because it affects their bottom line; and with the current economic pressures that becomes a problem'.³⁰

SOUTH AFRICAN ENTERPRISES IN CP

'No one else does what we do. We are the only ones that do the practical implementation. Not only for the SMEs, for everyone. That is why we also welcome the big companies.'³¹

South Africa is one of the most sophisticated and promising emerging markets in the world.³² The unique combination of well-developed first-world financial markets and a rapidly emerging market economy has given rise to an entrepreneurial and dynamic investment environment with many global competitive advantages and opportunities.³³ The primary mission of NCPC-SA is to promote the application of CP and sustainable industrial development in South Africa and so doing increase competitiveness and productive capacity of South Africa's industry, foster dialogue between industry and government and enhance investment in Environmentally Sustainable Technologies.³⁴

However, CP *per se* is not currently legislated in South Africa. There are also no legal instruments that can be used to enforce the reduction in the wastage of electricity and water.³⁵ Nevertheless, there are a number of laws and over-arching policies that are aimed at sustainable development and sound environmental management. These are as follows:^{36 37 38}

- The National Environmental Management Act (Act 107 of 1998)
- Mineral and Petroleum Resources Development Act (Act 28 of 2002)
- Mineral and Petroleum Resources Development Amendment Act (Act 49 of 2008)
- Air Quality Act (Act 39 of 2004)
- National Environmental Management: Waste Act, 2008 (Act 59 of 2008)
- National Energy Act (Act 34 of 2008)
- Water Services Act (Act 108 of 1997)
- Water Services Amendment Act (Act 30 of 2004)
- The White Paper on Integrated Pollution and Waste Management (IPWM) (2000)
- The National Water Act (Act 36 of 1998)
- The development of the National Waste Management Strategy (NWMS) for South Africa (2000).

Furthermore, Article 24 of the Bill of Rights in the Constitution of South Africa, 1996, stipulates that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that focus on the following:³⁹

- The prevention of pollution and ecological degradation
- The promotion of conservation
- Securing ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.

In recent years the South African government has been engaged in significant environmental law reform and one of the tone setters is unmistakably the country's progressive Constitution, which states that the people of South Africa have the right to an environment that is not detrimental to human health. This constitutional requirement becomes visible when one considers the National Cleaner Production Strategy drafted in 2004 by the Department of Environmental Affairs and Tourism.⁴⁰ The strategy contained in the document was prepared from the findings and inputs of the National Status Quo Report in combination with the outcomes of consultations with National Government key stakeholders.⁴¹ This framework in which the different stakeholders (government, industry and civil society) will participate has the primary objective of ensuring that South Africa achieves its goals of sustainable production and consumption.⁴²

Probably the most prestigious steps forward to transform South Africa to a country of sustainable production and consumption is the NCPC-SA programme of the DTI. As mentioned in the introduction to this case study, UNIDO and UNEP were responsible for developing NCPCs globally. These NCPCs acted as agents for CP in developing countries and economies in transition.⁴³ As a result all NCPCs are engaged in certain core activities. These activities include short-term training (up to five days) for SMEs and dissemination of generic information on CP.⁴⁴ All these centres are also engaged in conducting in-plant assessments combined with training and demonstration activities.⁴⁵

In South Africa, the objective of the NCPC-SA is to stimulate wider use of CP in partnership with the government and other role players, such as the manufacturing industry, processing companies and the consumer.⁴⁶ CP has been shown internationally to be essential if South Africa is to remain competitive in external and internal markets in the face of increasing pressures of globalisation.⁴⁷

Due to limited capacities, some SMEs have limited knowledge of cleaner technologies and methodologies that could help them to structurally improve their environmental performance.⁴⁸ These impeding factors to improved performance highlight the value and the role of the Centre in South Africa. The NCPC-SA currently focuses on eight priority sectors identified in the government's Industrial Policy Action Plan for 2010–2013 (IPAP2). The focus areas include: agro-processing; automotives; chemicals and pharmaceuticals;

commercial buildings; fibres, textiles and clothing; hospitality and tourism; metals, capital and transport equipment; and pulp and paper.⁴⁹ As the NCPC-SA director put it:

We adapt resource efficient and cleaner production methodologies, integrate those in a measurable continuous process, employing the strategies and methodologies in a way that allows companies to identify and understand their footprint and how to reduce it. We recommend measurable and preventative methodologies and strategies to help industry to improve their efficiency and competitiveness.⁵⁰

One of the core services offered by the NCPC-SA, as done by NCPCs internationally,⁵¹ is in-plant assessments for organisations to establish how CP initiatives can be implemented. Assessments undertaken at participating companies are conducted to identify areas where energy, water and raw material usage can be improved.⁵² The focus is on low-cost energy and resource efficiency solutions, aimed at assisting companies and plants in their efforts to become ecologically responsible, productive, low carbon, competitive businesses.⁵³ The director of the NCPC-SA explained this process by referring to specific questions that need to be answered when assessing plants or organisations:

- What do they produce?
- Why do they produce the product?
- What are their medium- and long-term goals for the product?
- What are the inputs in the process of producing the product?
- What does it take in terms of finances to produce the product?
- What does it take in terms of resources to produce the product?
- What does it take in terms of human resources (labour and skills levels) to produce the product?
- What does the customer expect in terms of quality?
- What does their competition do that allows them better access to the market?
- Why would the customer choose another product instead of theirs?

In response to these questions, an RECP consultant contracted by the NCPC-SA does an assessment to examine each step of the production line to ensure that the systems operate at an optimal level. This is done for every part of the production process up until the final product. The information gathered during these processes informs the report. Feedback is given to company management, and specific recommendations are made. The company is subsequently given more information on government schemes that companies can apply for as a tool to improve efficiency and competitiveness. These incentives are important since the general lack of access to appropriate financing can keep SMEs from making the changes, even if they would like to become environmentally sound manufacturers.⁵⁴ The recommendations include efficiency requirements, improvements and potential financial savings for the company should the recommendations be implemented.

Through the NCPC-SA, companies are thus assisted in their efforts to become ecologically responsible, productive, low-carbon and competitive.⁵⁵ The NCPC-SA has undertaken assessments at 61 production facility sites that resulted in the identification of potential saving opportunities to the value of R47 million between April 2010 and March 2011.⁵⁶ Furthermore, even though significant savings could be achieved by implementing efficiency improvements as explained, companies that adopted RECP as a tool to improve efficiency and competitiveness may also apply for government incentives aimed at supporting investment in RECP technologies.⁵⁷

Apart from doing assessments for organisations, the NCPC-SA also co-facilitates the Industrial Energy Efficiency (IEE) Improvement Project in South Africa⁵⁸. The IEE project was established in 2010 in response to the rising need to improve the energy efficiency of South Africa. UNIDO, together with the UK Department of International Development, the Swiss Secretariat for Economic Affairs, and in partnership with the DTI and the Department of Energy (DoE) of South Africa, embarked on a programme to address the global drive for greater energy efficiency.⁵⁹ The project aims to contribute to the sustainable transformation of industrial energy usage practice in the country, reduce carbon-dioxide emissions and to demonstrate the positive impact of energy management as a means of increasing profitability.⁶⁰ After its four-year lifespan, the IEE project will be integrated in the operations of the NCPC-SA.⁶¹ Table 3.2 summarises some of the resource efficiency and CP initiatives and progress made by the NCPC-SA in the different sectors. The initiatives highlighted include initiatives within the IEE project as well.

Table 3.2 Resource efficiency and CP in different sectors

Sector	Progress of initiatives within sector
Agro-processing	For the year 2007/2008, 23 companies were recruited for CP demonstration projects. Sub-sectors assessed for CP initiatives included: chicken abattoirs, ostrich abattoirs, organic farms, leather tanneries, breweries, chicken farms, wineries, oil refineries and footwear manufactures. During the year 2009/2010, 14 quick-scan and in-plant assessments were done for participating companies. Highly promising results were achieved with the various CP options, translating into a total of R5 693 221 in potential savings per annum.
Automotives	As South Africa's leading manufacturing and employment sector, the sector contributes 4,9% to GDP (2007) and attracted R27,1 billion in investments between 2000 and 2008. In January 2010, a project manager was appointed to this sector and subsequently awareness creation and estimations of the CP needs of this largely unexplored sector were established.
Chemicals and pharmaceuticals	The bulk of the CP activities in this sector revolve around CP assessments. These projects aim to gather information on the consumption patterns regarding resources (water, energy, raw materials and packaging materials) in various companies. The objective is to identify potential opportunities for the companies to reduce resource consumption and waste generation within their processes.

Sector	Progress of initiatives within sector
Commercial buildings	The NCPC-SA extended their services of energy assessments (audits) to commercial building facilities and operations by Energy Advisors. The NCPC-SA hosts the IEE project, which promotes energy management in industry. The IEE Programme introduced the Energy Management System Standard. The aim of this Standard is to benchmark an approach for energy management systems, which are sustained programmes over time (not ad hoc interventions) of continuous improvement in energy use that should become entrenched in company culture. These energy management systems could significantly influence the commercial building sector.
Fibres, textiles and clothing	The sector had severe challenges over the past few years with many company closures and job losses. This is due to cheap imports from the Far East. Despite various support mechanisms through a number of government programmes, the sector has struggled to remain competitive. Between 2006 and 2008 the NCPC-SA's programme for the sector has conducted at least 25 CP assessments in the Western Cape and KwaZulu-Natal, the clothing and textile hubs of South Africa. The Centre also embarked on a CP project, a studentship programme and an eco-labelling project in the sector.
Hospitality and tourism	The first tourism and hospitality assessment was completed in 2009 at Kruger National Park. In November 2011, the NCPC-SA recruited seven accommodation companies from George in the Western Cape to participate in the RECP Programme. The NCPC-SA has started cooperation and initiated stakeholder engagements in various regions and relevant tourism agencies and institutions. These include: The Outeniqua Tourism Association (Western Cape); Tourism Enterprise Partnership (TEP) (Western Cape); Cape Chamber of Commerce (Western Cape); Knysna Tourism (Western Cape); Ilembe Chamber of Commerce (KwaZulu-Natal); SANParks; Cape Nature (Western Cape); and the West Coast Tourism Association (Western Cape).
Metals, capital and transport equipment	In 2009, as part of stakeholder engagement and awareness raising, the NCPC-SA through the Metal Fabrication, Capital and Transport Equipment Sector approached the South African Stainless Steel Development Association (SASSDA) with the aim of establishing a working relationship. The NCPC-SA wanted to obtain buy in and support of the CP Programme, as well as gain access to the stainless steel industries. As a result, the NCPC-SA and SASSDA signed a Memorandum of Agreement (MOA) and SASSDA committed itself to recruit at least 10 of its member companies to participate in the CP programme.
Pulp and paper	Sector surveys that commenced in the pulp and paper sector were aimed at identifying the stakeholders and key needs of the sector. The intention of assessments was to ensure closer alignment of the NCPC-SA with the real needs and key challenges faced by industry participants. This information enabled the centre to plan activities involving these sectors in road shows and assessments.

Source: Compiled by authors^{62 63 64 65 66 67}

CAPACITY BUILDING

The availability of suitably skilled manpower is critical to the implementation and sustainability of RECP production methodologies and techniques in industry. The NCPC-SA therefore has a strong focus on capacity building through four interventions:

- **Training workshops at least once a year**, facilitated by the NCPC-SA and presented by international experts, aimed at enhancing RECP-related capacity in industry, among consultants and at all levels of government.

- **Training workshops at different levels** addressing energy management systems and energy systems optimisation. These are also facilitated by the IEE Project and regularly presented in Gauteng, KwaZulu-Natal and the Western Cape by UNIDO-contracted international experts.
- **A Sustainable Entrepreneurship Programme** involving the placement of post-graduate students in companies for a pre-defined period of time. Participating companies benefit from the availability of trained and dedicated human resources in addressing specific competitive gaps and/or environmental constraints, while students gain valuable CP experience, thus enhancing their employability.
- **A clean technology accelerator programme** for entrepreneurs and SMMEs to leverage new and innovative technologies, with particular emphasis on energy efficiency, renewable energy and green buildings. The objective is to stimulate green entrepreneurship, create more jobs and contribute to the sustainability of new eco-efficient enterprises.

KEY CHALLENGES

From the responses provided by authorities in the NCPC-SA, it became clear that the NCPC-SA faced some challenges. Twin challenges emerged: financial considerations and the local availability of relevant technologies are key barriers preventing full implementation of RECP recommendations, which is required to maximise the cost-saving benefits of RECP.

Organisations tend to limit the implementation of recommendations made to the less expensive housekeeping RECP solutions. Contributing to this challenge is the fact that there are no obligations on organisations to implement the recommendations made, and the NCPC-SA cannot enforce these recommendations on SMEs. Reducing energy, water and raw material use and the carbon footprint require investment in cleaner technologies. To address this, government is putting together a suite of incentive schemes, for which companies that adopt CP as a tool to improve efficiency and competitiveness can apply. This includes a tax rebate, a scheme to support the implementation of energy efficiency measures, and the soon-to-be-announced manufacturing competitiveness enhancement programme (MCEP) of the DTI. The NCPC-SA is therefore focusing on creating greater awareness of the DTI incentive schemes available to facilitate full implementation.

CONCLUSION

In this chapter the focus was on the (NCPC-SA) and the role it plays in RECP. RECP is one of the very latest methodologies aimed at improving productivity and optimising plant operations. It focuses on improving resource and energy efficiency by introducing more

efficient technologies and enabling solutions along the value chain. It is thus supporting long-term sustainability in terms of global competitiveness, ecology and employment.

CP is paramount in order to realise sustainable consumption, sustainable development and a low carbon and greener economy. The NCPC-SA has a major role to play in this regard. The growing demand for services from the NCPC-SA, as well as from companies other than SMEs, further demonstrates their paramount role in South Africa into the future. This is because there is a need to address environmental concerns in the country while simultaneously considering economic growth and job creation. The NCPC-SA as a whole can be seen as an important supporting mechanism in the path towards sustainable development and as an initiative to move towards a low carbon and green economy. The NCPC-SA faces some challenges, but it also offers the promise of future initiatives that will further contribute to the positive role it plays in industry. The government incentives aimed at supporting investment in RECP technologies will also play a role in enabling companies to adopt and implement RECP recommendations.

NOTES AND REFERENCES

- 1 United Nations Industrial Development Organisation (UNIDO)., 2011. National Cleaner Production Centre: South Africa. Available at http://www.unido.org/fileadmin/media/images/worldwide/Fact_sheets_new/SAF_EE_ncpc_2011.pdf [Accessed 19 January 2012].
- 2 Ibid.
- 3 Ibid.
- 4 NCPC-SA., 2008. *National cleaner production centre: South Africa*. Available at <http://www.ncpc.co.za/media/aboutus.html> [Accessed 12 January 2012].
- 5 Government of the Republic of South Africa., 2004. National Cleaner Production Strategy. (Draft 2 for comment – National and Regional Workshop). Pretoria: Government Press. p. 5.
- 6 National Cleaner Production Centre., 2010/2011. NCPC-SA Annual Management Report: *Operations and Financial review*. Department of Trade and Industry. p. 2.
- 7 Ibid.
- 8 United Nations Industrial Development Organisation (UNIDO)., 2011. Op Cit.
- 9 Ibid.
- 10 Ibid.
- 11 Grutter, J. M. and Egler, H., 2004. From cleaner production to sustainable industrial production modes. *Journal of Cleaner Production*, 12(3), 249–256.
- 12 United Nations Environment Programme., 2002. Changing Production Patterns: Learning from the experience of National Cleaner Production Centres. Nairobi: UNEP Division of Technology, Industry and Economics.
- 13 Glavič, P. and Lukman, R., 2007. Review of sustainability terms and their definitions. *Journal of Cleaner Production*, 15(18), pp.1875–1885.
- 14 Ibid. p. 1885.
- 15 Government of the Republic of South Africa., 2004. Op Cit. p. 6.

- 16 Ibid. p. 11.
- 17 NCPC-SA., 2008. Op Cit.
- 18 Van der Lugt, C., n.d. Resource efficiency. United Nations Environment Programme. Available at <http://www.unep.org/pdf/brochures/ResourceEfficiency.pdf> [Accessed 8 February 2012].
- 19 Ibid.
- 20 National Cleaner Production Centre., 2010/2011. Op Cit. p. 12.
- 21 Ibid. p. 2.
- 22 Ibid.
- 23 Boyle, C., 1999. Education, sustainability and cleaner production. *Journal of Cleaner Production*, 7(1), pp. 83–87.
- 24 National Cleaner Production Centre., 2010/2011. Op Cit.
- 25 National Cleaner Production Centre., 2007. Enviropaedia rethinking reality. Cleaner production. Available at http://www.enviropaedia.com/topic/default.php?topic_id=47 [Accessed 12 January 2012].
- 26 Ibid.
- 27 NCPC-SA., 2008. Op Cit.
- 28 Cloete, B., 2011. Confronting climate change: A South African fruit & wine initiative. Available at <http://www.climatefruitandwine.co.za/download/Information%20document%20-%20Recent%20Climate%20Change%20Policy%20Developments%20June%202011.pdf> [Accessed 5 March 2012].
- 29 Boyle, C., 1999. Op Cit. p. 83.
- 30 Director of NCPC-SA in an interview of 27 January 2012.
- 31 Ibid.
- 32 Department of Trade and Industry., 2011. *South Africa: Geared for growth*. http://led.co.za/sites/led.co.za/files/cabinet/orgname-raw/document/2011/sa_geared_for_growth.pdf [Accessed 20 January 2012].
- 33 Ibid.
- 34 Van Berkel, R. & Kothuis, B., 2008. Independent Evaluation of the UNIDO-UNEP Cleaner Production Programme: Country Evaluation Report: South Africa. Geneva: UNIDO.
- 35 NCPC-SA., 2008. Op Cit.
- 36 Ibid.
- 37 City of Cape Town official website., 2012. Environmental Resource Management: Environmental legislation. Available at <http://www.capetown.gov.za/EN/ENVIRONMENTALRESOURCEMANAGEMENT/PUBLICATIONS/Pages/EnviromentalLegislation.aspx> [Accessed 28 March 2012].
- 38 Department of Environmental Affairs., 2011. Policy legislation. Available at <http://www.environment.gov.za> [Accessed 28 March 2012].
- 39 NCPC-SA., 2008. Op Cit.
- 40 Government of the Republic of South Africa., 2004. National Cleaner Production Strategy. (Draft 2 for comment– National and Regional Workshop). Pretoria: Government Press. p. 4.
- 41 Ibid. p. 13.
- 42 NCPC-SA., 2008. Op Cit.
- 43 United Nations Industrial Development Organisation (UNIDO)., 2011. Op Cit.
- 44 Luken, R. A. & Navratil, J., 2004. A programmatic review of UNIDO/UNEP national cleaner production centres. *Journal of Cleaner Production*, 12(3), pp. 195–205.
- 45 Ibid. p. 198
- 46 Government of the Republic of South Africa., 2004. Op Cit. p. 6.

- 47 Ibid. p. 9.
- 48 Gombault, M. and Versteeg, S., 1999. Cleaner production in SMEs through a partnership with (local) authorities: Successes from the Netherlands. *Journal of Cleaner Production*, 7(4), 249–261.
- 49 National Cleaner Production Centre., 2010/2011. Op Cit. p. 14.
- 50 Director of NCPC-SA in an interview of 27 January 2012.
- 51 Luken, R. A. and Navratil, J., 2004. Op Cit. p. 195.
- 52 NCPC-SA., 2008. Op Cit.
- 53 Ibid.
- 54 Gombault, M. and Versteeg, S., 1999. Cleaner production in SMEs through a partnership with (local) authorities: successes from the Netherlands. *Journal of Cleaner Production*, 7(4), pp. 249–261.
- 55 National Cleaner Production Centre., 2010/2011. Op Cit. p. 14.
- 56 Ibid. p. 4.
- 57 National Cleaner Production Centre South Africa., 2011. Increased profitability through greener production: *Advertorial*. Department of Trade and Industry.
- 58 NCPC-SA., 2008. Op Cit.
- 59 Industrial Energy Efficiency., n.d. Industrial energy efficiency improvement project in South Africa. Available at <http://www.iee-sa.co.za> [Accessed 28 March 2012].
- 60 NCPC-SA., 2008. Op Cit.
- 61 Ibid.
- 62 NCPC-SA., 2008. Agro processing: Companies participating. Available at <http://www.ncpc.co.za/media/agroprocessing3.html> [Accessed 20 January 2012].
- 63 NCPC-SA., 2008. Chemical sector: Companies participating. Available at <http://www.ncpc.co.za/media/chemsector3.html> [Accessed 20 January 2012].
- 64 Anonymous (2006, 2 June). NCPC-SA Clothing Textile Component. *Nakisani*: The official newsletter of the NCPC. p. 3.
- 65 NCPC-SA., n.d. *Textile manufacturing activities*. Available at http://www.ncpc.co.za/ncpc_ct/tm_activities.htm [Accessed 20 January 2012].
- 66 National Cleaner Production Centre., 2009/2010. NCPC-SA Annual Management Report: Sector review. Department of Trade and Industry.
- 67 Energy Efficiency Forum., n.d. Sixth energy efficiency forum for commercial buildings. Available at http://www.capetown.gov.za/en/EnergyForum/Pages/Meeting_29032011.aspx [Accessed 29 March 2012].

4

Exxaro

Powering possibility through clean and renewable energy technology ventures

Muchaiteyi Togo

ABSTRACT

Exxaro Resources Ltd (Exxaro), a mining group based in South Africa, has established an energy company through a joint venture with Indian-based Tata Power Company. The energy company, Cennergi (Pty) Ltd, is founded upon renewable and clean energy technologies. The formation of the energy company is in direct response to real challenges that the group is currently facing, which include energy security issues, a high carbon footprint and possible future legal constraints to the coal industry, climate change as well as related environmental issues. Though Exxaro has a diversified mining portfolio, most of its profits are from coal. As such, the group will be negatively affected by any future constraints to the coal industry.

The aim of Exxaro's breakthrough project is to generate power for South Africa through a combination of renewable and clean energy sources. The energy company could set the pace in the South African energy industry by contributing towards energy security, reduction in carbon emissions, and in turn ensuring a low carbon footprint both within Exxaro and in the country at large. Its contribution will also be in terms of employment creation and revenue generation. There are still areas in which the group can improve, for example by developing Clean Mechanism Development (CDM) projects. The formation of an energy company is not the first green initiative at Exxaro; before this, the company embarked on a green housing initiative for its employees in Lephalale in Limpopo Province. The green housing initiative had major environmental, social and economic benefits to the community.

INTRODUCTION

This chapter profiles Exxaro's low carbon breakthrough initiative represented by the company's transition to clean and renewable energy technology ventures. Exxaro is a

majority black-owned mineral resources consortium based in South Africa. It was formed in 2006 through an empowerment process that entailed a merger of Eyesizwe and Kumba Resources, and the re-listing of Kumba as Exxaro Resources.¹ Exxaro has mining interests in coal, mineral sands, base metals, industrial minerals and iron ore and is the leading mining group in the country.² Exxaro is one of the biggest black empowerment mining companies listed – among top 40 companies – on the Johannesburg Stock Exchange (JSE) and is also recognised to be one of the best performing constituents of the Johannesburg Stock Exchange Social Responsibility Index (JSE SRI).³ The group's operations are international and, besides South Africa, they also operate in Namibia, Australia and China.⁴

Coal mining contributes about 60 per cent of Exxaro's revenue and in the first half of 2010, 88 per cent of net operating profits were from coal.⁵ The group produces power station, steam and coking coal.⁶

All of its power station coal is supplied to Eskom and municipal power stations. Exxaro is the second largest producer of coal in South Africa⁷ and has signed an agreement with Eskom to supply coal to its Medupi Power Station for the next 40 years.⁸ The group has other projects in the pipeline that may result in Exxaro becoming the largest coal producer in the country by 2018.⁹

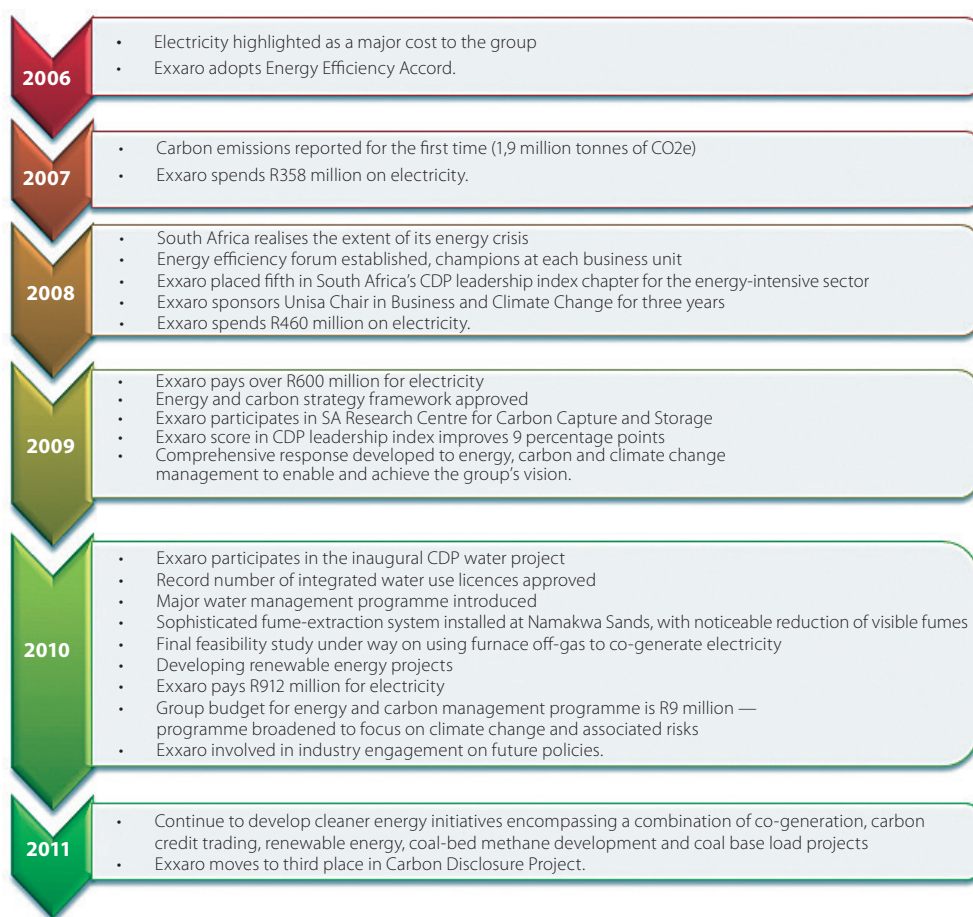
Mining operations have a high environmental impact and, as a rejoinder, Exxaro is embedding sustainable development in its practices as part of its brand. Most of the group's sustainability initiatives, including those reported in this section, are documented in its 2010 Annual Report that discusses energy and carbon management in the company. Exxaro has a safety and sustainable development policy through which it commits to stakeholder consultation on environmental issues, compliance with legislation, natural resources conservation and continuous improvement in terms of safety and sustainable development, among other things.¹⁰ Its approach is to minimise the use of natural resources, and ensure that business operations do not undermine environmental services. To this end, Exxaro observes all environmental legal requirements and all other environmental compliance requirements that are not necessarily statutory, for example the Carbon Disclosure Project; and has internal processes that include the development of innovative policies and programmes aimed at tackling impacts of company operations on the environment and use of natural resources.¹¹ Among others, some of the specific sustainability initiatives by Exxaro include: biodiversity management, air quality management, water conservation, mine rehabilitation, environmental policy compliance and environmental reporting.

In addition, Exxaro is a signatory of the United Nations Global Compact, a voluntary global initiative requiring signatories to show their leadership and responsibility in environment, social and governance (ESG) issues.¹² In sustainability reporting, the company is guided by the Global Reporting Initiative (GRI), which provides indicators of economic, environmental and social performance. The group established four research chairs that it funds to do research on climate change, biodiversity, sustainability, energy efficiency and other environmental issues in three universities around South Africa. The chairs are

at the University of South Africa (Unisa), the University of Witwatersrand and University of Pretoria. Since its establishment in 2006, Exxaro is increasingly initiating plans and strategies that respond to climate change issues and energy efficiency.

Figure 4.1 models the group's green timeline. It illustrates that climate change and clean energy, among other sustainable development issues, form part of Exxaro's main sustainability focus areas. It also shows a gradual development of climate change concerns, starting with the adoption of the Energy Efficiency Accord in 2006. With time, the company became increasingly involved in climate change-related initiatives such as carbon accounting, climate change research funding, fume extraction and the development of renewable energy projects, among others. A dual approach targeting mitigation and adaptation issues in addressing climate change is employed through an energy and carbon management programme. The emphasis of the group is on evaluating and developing environmentally friendly energy projects.

Figure 4.1 Exxaro's green timeline since 2006



Source: Exxaro Resources

The next section explores issues of concern in the coal mining industry and the South African energy sector which is dependent on coal; specifically climate change and a low carbon economy. It is followed by a section that documents Exxaro's breakthrough initiatives. The section outlines the drivers and enablers that influenced the Exxaro breakthrough and discusses other initiatives of interest to a company adapting to a low carbon economy. It explores planned future perspectives to address issues pertaining to a low carbon economy by Exxaro. The conclusion then highlights a few observations made from the Exxaro breakthrough initiative.

LOW CARBON AND GREEN ECONOMY IN THE COAL INDUSTRY

Coal, among other mineral resources such as gold and diamond, plays a significant role in the global economy as well as in South Africa. It is a widely distributed mineral, is the most abundant fossil fuel and it underpins global economic development.¹⁴ It is recognised for its role in energy production,¹⁵ a significance that dates back to the Industrial Revolution. It is a 'cheap' energy source, especially for developing countries, but is also a very dirty fuel. Currently about 23 per cent of primary global energy needs and 40 per cent of electricity come from coal.¹⁶ Its use is likely to increase, especially due to rising energy demands but also due to the availability of vast coal reserves in some countries such as the United States (US) and China.¹⁷

South Africa has huge coal deposits and is recognised as one of the world's leading coal producers. The country's economy primarily depends on coal for energy, contributing about 92 per cent of total electricity generated.¹⁸ At continental level, South Africa generates more than 50 per cent of the electricity used in Africa.¹⁹ The energy sector itself is important in the overall economy in the country, contributing 15 per cent to the GDP²⁰ and about 12 per cent of total employment in the sector.²¹

Despite vast coal deposits, the country is facing challenges of energy security. Energy shortages became apparent in 2006 with power cuts in the Western Cape which later spread nationwide. Eskom, the sole electricity provider on the national grid, was failing to meet demand. The reason for this dates back to between 1999 to 2004 when the government was considering dismantling Eskom and introducing private investment to improve market efficiency.²² This suggestion was met with resistance from both the political and trade union fronts and Eskom was given the responsibility once again to expand electricity generation. By then, Eskom was four years behind schedule. Coupled with other challenges, such as a bad state of repair of its plants and the decrepit state of coal stockpiles, the result was electricity demand outstripping supply, hence nationwide power blackouts by 2008.²³ The situation has since changed and the role that Independent Power Producers (IPPs) could play in energy supply is now widely acknowledged. For example, the Guide to IPP processes²⁴ states that:

It is crucial that the private sector plays a role in addressing the future electricity needs of the country. This will reduce the funding burden on government, relieve the borrowing requirements of Eskom and introduce generation technologies that Eskom may not consider part of its core function, which may play a vital role in the future electricity supply options, in particular off-grid, distributed generation, co-generation and small-scale renewable projects.

This shift in the mindset regarding energy supply in South Africa was an important landmark that paved way for IPPs to penetrate the electricity energy market.

ENVIRONMENTAL IMPACTS OF COAL MINING AND COMBUSTION

Coal mining pollutes the atmosphere, changes land-use patterns and destroys habitats, causes surface and groundwater contamination (acid mine drainage), and disturbs the hydrological cycle. In addition, trace elements contained in coal have diverse and serious adverse effects on human health, for example on child development, and on the nervous and immune systems; can cause cancer, and can lead to or worsen respiratory diseases.²⁵

However, the most worrying aspect of coal, with regards to climate change, is the release of GHGs, particularly carbon dioxide, into the atmosphere. Coal is more carbon-intensive than any other sources of energy and globally accounts for about 20 per cent of all GHG emissions.²⁶ The release of greenhouse gas generally happens during processes such as coal mining, coal preparation, its transportation, combustion for electricity generation, coal disposal and accidental ignition of waste dumps. Coal-fired power stations are among the largest sources of carbon emissions. Methane gas, which is 25 times more potent than carbon, is another concern in South Africa where Coal Bed Methane emissions contribute an estimated 8 per cent of the total GHG emissions.²⁷

In South Africa, there is burning of low-quality coal which has a high ash content estimated to reach up to 65 per cent.²⁸ This poor-quality coal results in higher rates of pollution compared to high-grade coal. While this has enabled the country to supply cheap electricity according to world standards,²⁹ it kills incentives among industries and households to adopt energy efficient technologies, resulting in increased GHG emissions.³⁰ South Africa's Department of Environmental Affairs (DEA) estimated that the energy sector, including coal mining operations, contributes around 79 per cent of all GHG emissions in the country.³¹

The irony with South Africa is that it is among the top 14 most carbon intensive economies in the world, but is a developing country and is therefore not bound by any international treaties to reduce its carbon emissions. Its GHG emissions are reportedly far above the global per capita average.³² From this discussion it can be noted that the energy sector is the most significant sector; and by default, the intervention area that will dictate South Africa's climate change and low carbon future. Whatever decisions are made within and for the energy sector (especially about the production of energy from

coal), will influence the future of emissions in the country. Fortunately, commitment and political will is there, as reflected by President Zuma's pledge at Copenhagen to reduce emissions in the country below the 'business as usual scenario by 34% in 2020 and 42% in 2025', subject to the provision of resources, capacity building and technology transfer.³³

COAL POLICY, PLANNING AND LEGISLATION IN SOUTH AFRICA

It is concerning that South Africa does not have a comprehensive coal policy despite its significance in the energy sector and the overall economy of the country. Coal policy and planning is fragmented among different ministries and stakeholder groupings such as the Ministry of Mining, the Ministry of Energy, the Ministry of Environmental Affairs and another interest group made up of Eskom, the private sector and other stakeholders.

Fragmented sections which refer to coal exist in some of the policies represented by these stakeholders; however, some of these are outdated, for example the 1998 Energy Policy White Paper.³⁴ In a small section dedicated to coal, the White Paper advocates the continued deregulation of coal energy but also for investigating the use of coal discard streams and stockpiles, clean technologies, low-smoke fuels and the resource potential of coal bed methane; and the possible application of tax concessions and/or penalties to promote market-driven clean coal technologies. Another example is the recently released National Climate Change Strategy White Paper³⁵ by the DEA, which documents the following 'promising' (climate) mitigation measures, among others:

- Increasing investment in renewable energy
- Shifting to lower-carbon electricity generation options
- Carbon capture and storage in the synthetic fuels industry.

The general drive reflected in the policies is a shift to clean technologies and renewable energy sources, both of which affect the coal industry. A number of policies that govern renewable energy are already in place, for example the Renewable Energy White Paper (2003) which, among others things, estimates the power potential of various renewable energy technologies and explores opportunities for their implementation.³⁶ Another example is the Renewable Energy Feed-In Tariff (REFIT) which lists the qualifying technologies, the eligibility criteria for such technologies with the National Energy Regulator of South Africa (NERSA) overseeing REFIT tariffs and facilitating power purchase agreements, among others.³⁷

In the absence of a comprehensive coal policy, Eskom, the sole electricity provider via the national grid, facilitates discussions between government and the private sector on issues related to coal supply. Private companies involved in coal mining and other stakeholders, supported by the Fossil Fuel Foundation, developed a South African Coal Road Map (SACRM) which gives insight into future developments in the industry.³⁸ The Road Map could possibly bridge the policy gap that exists in South Africa in the coal

mining industry, by guiding the industry in future activities. This could ensure continued survival of the coal industry amid a number of imminent risks of all kinds, including the afore-mentioned transition to renewable energy resources. The following section briefly outlines some of these risks.

RISKS FACING THE COAL INDUSTRY IN SOUTH AFRICA

Risks in the coal industry are likely to stem from legal requirements, changing consumer priorities and increasing mining costs, among others. Box 4.1 illustrates a number of risks that some authors^{39;40} have reported.

Box 4.1 Risks facing the coal industry in South Africa

Legal risks that the coal industry is likely to face, due to high emissions, include emissions caps and carbon taxation. There is already a carbon tax of 2c/Kwh that was implemented in 2009 but this is likely to increase in the future. Coal is an important source of foreign currency in South Africa. However, there is a high possibility that the demand for coal (and other carbon-heavy products) will decline at global level, which could affect not only the industry, but the South African economy as well if mitigation measures are not put in place timely.

Coal prices are likely to increase in future due to less accessible seams, which will affect mining costs and hence the price of coal; and as a result of carbon regulation (e.g. emission caps). This will ultimately affect other sectors that are reliant on coal, especially the energy sector and consumers of electricity. Another risk is the decommissioning of old coal fire stations, which is set to take place from 2021. After that, it is uncertain whether any new coal-fired power stations will be built and, if so, there is likely to be a great deal of precaution to reduce GHGs from those operations. Since GHG emissions in South Africa are reportedly way above the global per capita average, a shift to equal per capita rights in global policy and legislation would create the need to ensure a fall in the current pattern of carbon emissions in the country.

South Africa is caught up in a paradox where, on the one hand, it is a developing country characterised by poverty and other development challenges such as HIV/Aids, which makes it necessary to foster rapid economic development. Coal, for instance, has been playing a catalytic role in the development process both in energy provision and in Black Economic Empowerment initiatives, which have resulted in 30 per cent ownership of coal mines by black South Africans.⁴¹ On the other hand, South Africa's carbon emission levels are characteristic of the developed world and are even higher than those of many developed countries. The challenge it now faces is how to reduce emissions without compromising economic development.

It is projected that the use of coal for power generation will continue in the near future⁴² in South Africa because of the abundance of coal reserves. However, care must be taken to integrate the objectives of a low carbon economy in coal use to proactively address the risks that the industry is facing. Currently the two major shifts in the energy sector are the afore-mentioned shift into renewable energy, and investment in clean coal technologies. These are further elaborated in the next section.

RENEWABLE ENERGY AND CLEAN COAL TECHNOLOGIES

Renewable energy options are abundant in South Africa, especially wind and solar power sources. However, these are not tapped for the national grid but are privately exploited by farmers (wind power) or are used in schools, clinics and households in rural areas (solar power). Generation potential is estimated at approximately 23 GWh of installed capacity for wind resources while for solar radiation levels, purportedly the highest in the world, it is argued that most parts in the interior of the country receive solar energy of more than 5 kWh/m²/day.⁴³ There is also potential for investing in bio-fuels, and companies such as Sasol are already exploring its use.

Without going into much detail, a selection of clean coal technologies is also available. Investing in clean coal technologies enables the country to continue generating electricity from coal while at the same time adhering to environmental regulations.⁴⁴ South Africa is said to be at the forefront of research in clean coal technologies and Eskom is making significant contributions to that field.⁴⁵ Some technologies being explored worldwide include:

- Carbon capture and storage from coal mines
- Production of ultra-clean coal that reduces ash from the coal, allowing it to be directly fired in gas turbines at higher efficiency and lower GHG emissions
- Fluidised bed combustion (FBC)
- Advanced pulverised fuel combustion
- Fuel cell technologies utilising gas from coal
- New pollution control devices – such as advanced scrubbers – that clean pollutants from flue gases before they exit a plant's smokestack
- High temperature solar thermal applications integrated into coal fired power generation.⁴⁶

Transition to these technologies is not without its challenges. For example, adopting renewable energy technologies would mean high capital investments and, in addition, a great deal of research is still needed in clean energy technologies, especially in the South African context. The most important advantage of renewable energy lies in it being renewable as well as being a clean source of energy. Adoption of clean coal technologies have the advantage that companies involved in the coal sector will have a chance to 'clean up their act' and possibly continue surviving in a carbon-constrained environment. The country's economy will therefore continue to benefit from coal and the imminent transition to renewable resources, whether as a result of legal restrictions or exhaustion of coal reserves, will not come as a shock.

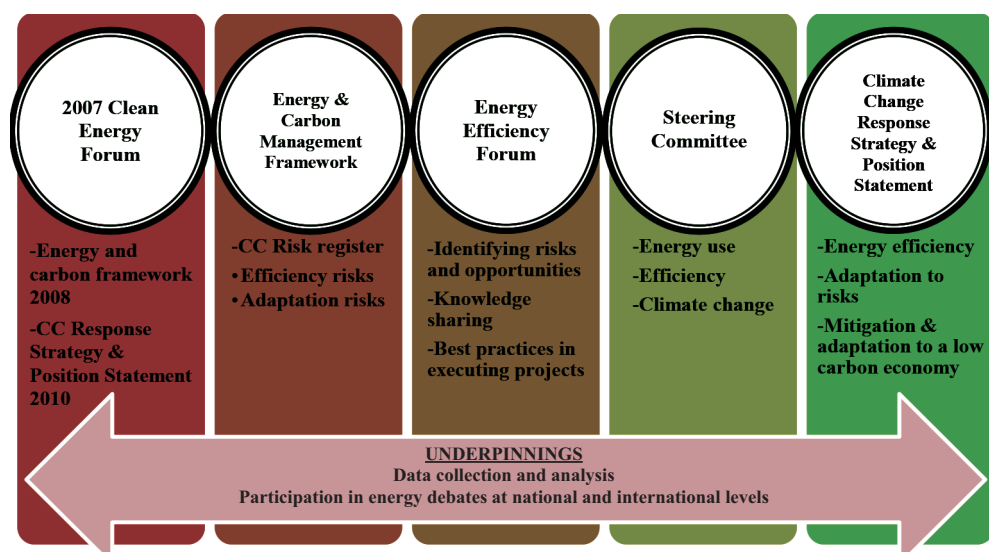
Exxaro has put an initiative in place whereby they invest in both renewable and clean coal technologies. These technologies are highly dependent on coal and therefore face all the risks that the coal industry is expected to suffer. As shall be discussed later, this

transition is a direct response to the risks of a carbon constrained future, among other factors internal to the operations of the company such as economic costs and energy security. The initiative, which is its low carbon breakthrough, has been realised through the formation of an energy company that will generate power using clean technologies and renewable resources.

BUSINESS CASE AND ENABLERS FOR TRANSITION TO LOW CARBON

The course to Exxaro's transition to a low carbon and greener company began in 2007. This is when the company's leadership recognised that, in order to remain competitive and sustainable for the benefit of all stakeholders, they had to deal with energy in a holistic manner considering deficiencies and costs, as well as impacts on the environment, including climate change.⁴⁷ Three main issues were identified and addressed, and have since become central to the local energy environment: (1) energy security (security of supply, reliability) (2) economic productivity (growth in demand, price volatility) (3) environmental impact (climate change, land and water use, carbon emissions).⁴⁸ The success of the whole initiative depended on the creation of an enabling environment. Exxaro has put structures in place to spearhead and/or facilitate the process of responding to climate change issues (see Figure 4.2).

Figure 4.2 Enablers that facilitated the Exxaro breakthrough
CC = Climate Change



Source: Author⁴⁹

Figure 4.2 summarises the group's major enablers, and illustrates how in 2007 Exxaro established a Clean Energy Forum that paved way for the establishment of an Energy and Carbon Management Framework in 2008, and later a Climate Change Response Strategy and Position Statement.⁵⁰ These elements are managed as an integrated programme across multiple functions and all business units. They are linked to Exxaro's vision, mission and values, and are aligned with its Sustainable Development Strategy. The programme is monitored and driven by a Steering Committee with executive level representation. The Steering Committee considers issues of energy use, energy efficiency and climate change and reports into corporate governance at the highest level, including the Exxaro Board.

An Energy Efficiency Forum (see Figure 4.2), also formed in 2008, consists of representatives from each of Exxaro's business units. The forum's tasks include identifying risks and opportunities, information sharing and developing practices that are more effective in implementing energy efficiency projects.⁵¹ A group-wide energy overview and assessment process has been completed with emphasis on evaluating each process from an energy-saving point of view, understanding how energy is being used, analysing energy bills and evaluating power factor performance. Energy efficiency is being addressed within plant design, with recent projects being the new coal plants at Grooteegeluk 7 and 8 and the energy-efficient houses built in Lephalale for employees.⁵² Exxaro is already reaping the fruits of energy saving; for example, it invested R49 million in energy efficiency projects in 2010 that resulted in a saving of R21 million per annum.

Having the Energy and Carbon Management framework in place has allowed Exxaro to update its risk register to include climate change risks.⁵³ The short-term climate strategy concentrates on efficiency and adaptation to risks posed by legislation and environment changes. The long-term strategy concentrates on Exxaro's adaptation to a future low carbon economy and measures to minimise the impact from changes in the physical climate.

All the initiatives are underpinned by efficient data collection and analysis (see Figure 4.2). Energy data was centralised in 2010 into a generically developed Exxaro energy database, which collates direct and indirect emissions, run of mine product outputs and the corresponding energy intensities.

Besides initiatives within the company, Exxaro is also involved in energy initiatives within a broader context. For example, among the four chairs that Exxaro sponsors, at the University of South Africa (Unisa) it funds the Business and Climate Change Chair aimed at advancing the cause for climate responsibility in South Africa through advocacy, training and research.⁵⁴ Exxaro also takes part in energy debates at various levels including local, national and international levels, as part of a diversity of interest organisations^{55;56} including:

- Jointly-organised Business Unity South Africa (BUSA) and Department of Trade and Industry (DTI) Climate Change Initiative
- National Business Initiative (NBI)

- Energy Efficiency Technical Committee of the Energy Efficiency Accord
- Energy Intensive User Group (EIUG)
- Coaltech 20/20
- Fossil Fuel Foundation
- National Energy Regulator of South Africa (NERSA)
- South African Independent Power Producer Association (SAIPPA)
- United Nations (UN) Global Compact (the South African chapter of the Global Compact that is managed by the NBI)
- Chamber of Mines.

POWERING POSSIBILITY THROUGH CLEAN AND RENEWABLE ENERGY

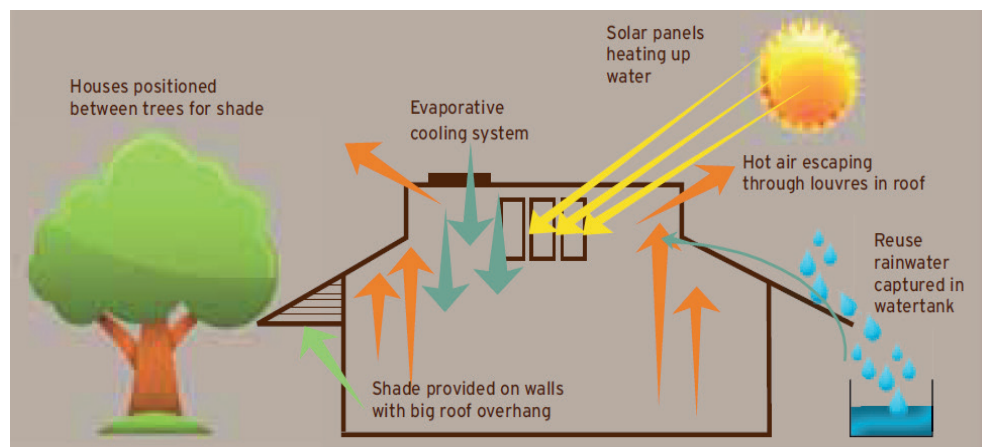
Exxaro's flagship breakthrough is the formation of an energy company that will generate power for South Africa from renewable sources and using cleaner energy technologies.⁵⁷ The energy company, Cennergi (Pty) Ltd, was launched in April 2012 as an equal-share joint venture with Indian-based Tata Power Company through Khopoli Investments, its subsidiary.⁵⁸ The group embarked on the project in 2009 with the overall aim of establishing a diversified IPP that sets it apart from its competitors. The key renewable and/cleaner energy focus areas being explored include: wind, solar, co-generation, gas, coal-base load and bio-fuels. The company submitted five renewable energy projects (two solar and three for wind energy) in March 2012, in response to the Department of Energy's 'request for qualification and proposals for new generation capacity'.⁵⁹ Preliminary studies are underway to determine if it is worthwhile to continue with the projects. The following is a list of the projects and a description of the phases in which each of them are as reported in various reports and news releases.^{60;61;62;63}

- The energy company is in pre-feasibility phase for two wind farms: A 40 MW wind farm at Brand-se Baai in the Western Cape, and a joint venture with Watt Energy, a 60 MW wind farm at Tsitsikamma in the Eastern Cape.
- The company is also in pre-feasibility phase for a 30 MW Concentrating Solar PV Power Plant at Lephalale in Limpopo.
- The group is developing a Coal Bed Methane test project in Botswana. The aim of the project is to test for economic gas flow. The project could generate 50–100 MW of electricity.
- Another pre-feasibility study is underway to develop a 600–1 800 MW base-load IPP coal-fired power station. The base-load IPP programme guides the development of a 600 MW circulating fluidised bed (CFB) cleaner coal. The grid emission factor for CFB coal-generated electricity is potentially 0,80 tCO₂e/MWh, while the grid emission factor of electricity bought from Eskom is 1,03 tCO₂e/MWh.

- Exxaro invested in co-generation projects at its business units in Namakwa Sands and Grootegeluk. The capital cost of the 13,6 MW Namakwa Co-generation and the 102 MW Grootegeluk Reductants project is R250 million and R1,25 billion respectively.
- Exxaro is also investing in a bio-fuels project aimed at generating bio-diesel for use within the company to reduce its carbon footprint. The project will involve the installation of three processing units with a combined estimated output of 42 million litres per annum of bio-diesel derived from soya feedstock. This project has the potential to reduce tailpipe GHG emissions by about 41 per cent. The quantity of bio-diesel produced should cover the requirements of Exxaro's Mpumalanga mines. Capital costs for the project are expected to go up to R245 million.

Apart from the breakthrough flagship, the energy-efficient employee housing initiative comes through as yet another low carbon and greener economy take. When Eskom's Medupi Power Station, the biggest infrastructure development project ever undertaken in South Africa,⁶⁴ was constructed, Exxaro had to expand its Grootegeluk coal mine to provide for the required additional 14,6 million tonnes of coal per annum. Both projects led to the growth of Lephalale, a small rural municipality, into a metropolitan area as big as Polokwane, a development that had to be complemented by the simultaneous and rapid expansion of infrastructure (roads, electricity and water systems).⁶⁵ Due to the planned expansion, housing had to be provided for approximately 550 new workers, as well as a backlog of approximately 247 units for employees already in service at Grootegeluk but who were staying in rented accommodation in Lephalale. Projected building costs for the 797 houses were around R590 million. To Exxaro, this was an opportunity to implement corporate social responsibility strategies, including skills development and socio-economic development.

Planning for the housing development took place at the same time that South Africa was experiencing problems with meeting its electricity demand. Growing global awareness about climate change issues also drew Exxaro's attention to the need to reduce its GHG emissions and to reduce electricity demand in its new housing development. It was therefore decided to build houses that were less reliant on a connection to the national power grid for electrical energy. Figure 4.3 is a model of the main 'green' features of the housing scheme.

Figure 4.3 Lephalale eco-housing projectSource: Exxaro Resources⁶⁶

The features of the houses are summarised in Box 4.2.

Box 4.2 Green design features of Lephalale houses

- Houses face north-north-east and are located between trees for better temperature regulation and efficient lighting.
- Houses are insulated with Alububble® for improved temperature regulation and hence energy costs savings.
- Houses were built with overhanging roofs to capture rain water that can be used for washing and gardening. Overhanging roofs also reduce cooling requirements.
- Solar heating is provided for the heating of water, to save electricity and to reduce greenhouse gas emissions.
- The Energy Efficiency Goals as set by the DoE were analysed and incorporated into the plans for the housing.
- Evaporative cooling units were installed as they use less water than that used in the generation of electricity for standard air conditioning units.
- Cooling units were installed with motion sensors to reduce electricity usage.
- Gas stoves, which are more efficient for cooking and produce low carbon emissions, were installed.
- A mix of housing types, design and locations were created to ensure affordability across the range of income groups within Exxaro.
- Electricity and water savings could result in a 40% saving on municipal accounts.
- Water-wise gardens were established that require just 30% of the water used in a 'normal' garden. All the plants for the garden were selected from the local area.
- Local resources, including labour, were used as far as possible to promote economic growth and skills development.

Source: Exxaro Resources⁶⁶

Through the incorporation of energy efficiency initiatives and/or design elements, the Lephalale housing initiative will result in the direct saving of 2 334 MWh per annum or the equivalent of 2 400 CO₂e/t. Using a potential carbon tax of R100 per tonne of CO₂e, this will result in a saving of R240 000 per year for Exxaro employees who are

the beneficiaries of the housing projects, should carbon tax be implemented. The various energy efficient building methods employed in the Lephalale housing project can also be applied to other development projects.⁶⁹

These low carbon initiatives closely relate to Exxaro's vision, which states that 'through our innovation and growth we will be a powerful source of endless possibilities'.⁷⁰ The vision is applied to the group's growth strategy to provide excellent returns for its stakeholders, and is carried through to its corporate social responsibility strategies. The initiatives also relate to its strategy for socio-economic development that calls for the 'application of funds, goods and labour to provide sustainable services for the local community, which can be owned, managed and maintained by that community'.⁷¹ In the case of the Lephalale Housing Development Project for example, a pilot building project for the construction of five houses was initiated in the nearby town of Marapong. The focus was on the use of 'environmentally friendly building materials and appliances such as eco-friendly bricks, zinc-fuel battery systems to power lights and small electrical appliances, to prove their cost-effectiveness for future Exxaro housing projects and the provincial housing department'.⁷² A further motivation was civil engineering skills development and entrepreneurial training among the previously disadvantaged youths in Marapong Township.⁷³

Together with Eskom, Sasol, the government and local stakeholders, Exxaro also initiated the Lephalale Development Forum that focuses on development of infrastructure and facilities for social services such as sports, health and welfare, housing and education within the municipality.⁷⁴ Overall benefits as reported in its 2010 Annual Report⁷⁵ include:

- the creation of 24 direct jobs with the construction of the eco friendly houses at Marapong
- A total of 101 indirect project beneficiaries from the Marapong project
- Accommodation for 1 124 employees in mixed houses and flats in Lephalale
- Out of a total of 1 023 contractors, 50% were from the local community
- Of the total investment of R25,2 million, 40% went to local suppliers and sub-contractors
- Roads, water recycling systems and other infrastructure benefits for the municipality were realised
- The training and mentoring of 41 people in house and road construction and brick making at Grootegeeluk
- The upgrading of the water reticulation and sewerage plants for the town of Lephalale.

In summary, the project resulted in many positive impacts in terms of energy savings, environmental awareness, skills development, provisioning of housing and infrastructure. The project highlighted the leadership role that Exxaro is playing by demonstrating how costs can be saved through implementing energy efficiency initiatives and by continuing

to influence initiatives that promote social responsibility where energy efficiency is concerned.⁷⁶ One example is the recent donation of energy-efficient air conditioners to local schools by Exxaro contractors. Commitment by the group to energy efficiency has since filtered through its socio-economic development initiatives and positive outcomes are permeating the whole country's energy environment.⁷⁷

Exxaro's breakthrough is coming at an opportune time especially since the group itself consumes a lot of energy and has embraced the green economy concept. It uses about 1 per cent of the energy generated by Eskom and in 2006 it produced more than 1,5 million tonnes of carbon dioxide equivalent (CO₂e) from electricity consumption purchased from the Eskom grid and 379 443 tonnes of CO₂e from fuel consumption (petrol and diesel).⁷⁸ Formation of a clean energy company clearly shows progressive thinking as it prepares the company for a carbon-constrained future and other uncertainties related to possible legal obligations.

The success of the energy company would not only mean that the group will be self-reliant in terms of energy supply, it will also have a share in supplying the national grid, which means revenue generation. This positively contributes to improving access to electricity in the country. The energy company is therefore filling in or contributing to filling in an existing capacity gap in the country in the face of energy shortages in South Africa. Tapping into renewable and clean energy technologies will also serve as an example to the country in terms of energy efficiency and best management practices that the green economy is calling for. While Eskom is investing in new generation capacity, the plants are still coal fired and, without the intervention of IPPs, this could mean continued reliance on dirty fuel while many renewable resources (wind, solar, bio-fuels etc.) remain untapped.

Investing in energy generation by Exxaro has the added advantage of diversification of its portfolio. It is clear that the future of coal, at least in the long term, is becoming uncertain and this should be a concern, especially for a company such as Exxaro where more than 60 per cent of net operating profits are from coal. While South Africa is said to have considerable coal reserves which could last for a couple of hundred years to come, there is a possibility that coal demand will peak soon and then fall after 2020 due to the environmental constraints mentioned before (climate change, acid mine drainage, etc.).⁷⁹

It is not clear how the entry of IPPs in the energy supply sector in South Africa will affect pricing. State-owned suppliers often set low prices and in South Africa this is attributed to government policy to promote growth, which has had the effect of repelling private investors.⁸⁰ This creates challenges when private providers become part of the equation, especially in terms of cost-effectiveness, as renewable energy is said to be capital-intensive.⁸¹ However, IPPs could just be the investment that South Africa needs and could restore people's hope of constant energy supply in a low carbon economy. They are already believed to have potential to build power stations more cheaply and faster, and operate them more efficiently than Eskom.⁸² This can be attributed to lack of incentive on the part of Eskom because of its monopoly in power supply in South Africa.

Some of the technologies that Exxaro is adopting have both advantages and disadvantages. One example is the FBC technology, a new technology not yet in use in South Africa,⁸³ which involves the fluidisation and combustion of a bed of coal at high temperatures. Its advantages include being able to burn extremely low-grade coal and using significantly less water in the control of emissions. However, FBC is less efficient than other technologies such as equivalent pulverised fuel plant.⁸⁴ Concerns have also been raised around technological issues and commercial costs in the production of energy from methane. The Exxaro methane initiative in Botswana to test for economic gas flow⁸⁵ therefore reflects a bold move and a willingness to invest resources in alternative technologies. This will also be of great benefit in emissions reduction, bearing in mind the potency of methane gas.

There are still controversies and contests with regard to some of the renewable technologies such as bio-fuels. Some argue that use of bio-fuel increases GHG emissions, unless the production processes rely on wastes such as wood slash, straw and corn stalks. The argument is based on the fact that taking agricultural land to grow bio-fuel crops may result in high food prices, consequently driving farmers to convert existing forests into farmland and thereby releasing carbon stored in those forests, challenging food security. According to this line of thinking, to equal out the GHGs released when the land was cleared, it will take 167 years of, for example, ethanol production per hectare.⁸⁶ Not many negative effects have been reported from other renewable sources such as wind and solar. The installation of wind power has been blamed for sight pollution, bird strikes and turbine noise; problems which are believed to mostly relate to perceptions rather than realities.⁸⁷ In both cases, precautions have to be taken to study potential impacts before such projects are implemented. With adequate research, negative eventualities can be avoided.

KEY CHALLENGES AND OPPORTUNITIES FOR FUTURE IMPROVEMENTS

Only one key challenge was identified, that is, educating the company. Championing a low carbon footprint in a corporate means that the company needs to be educated and made to believe that climate change is a real threat. Education and buy-in forms the basis for serious action and commitment, and being proactive rather than to wait and face value-destructive reactive compliance-based actions. This was said to be the most challenging aspect; that is, to promote ownership within the company and to demonstrate this by acting in a committed way.

There are, however, a number of other areas that present the company with opportunities to improve its low carbon initiatives in future. The group is identifying opportunities in strategic minerals essential for a green economy and hedging through investment in businesses that will be prominent in a low carbon economy. Exxaro is seeking a CDM status and, for some of its projects, it has made progress towards ensuring Carbon Emission Reduction (CER) registration with the United Nations Framework Convention on Climate

Change.^{88;89} Participation in the Carbon Disclosure Project (CDP) has enabled it to initiate processes to measure its carbon emissions while also providing important insights on overall company emissions and enabling target setting in its energy strategy.^{90;91} Exxaro achieved the tied-fourth highest score in the CDP 2010.⁹²

Exxaro is expecting a binding agreement on emissions reduction between most countries, South Africa included, around 2020.⁹³ The 2c/kWh levy introduced in 2008 on non-renewable sources of electricity is essentially a carbon tax, to be used in a bid to spur greater investment in low-carbon technologies. This tax could increase in the future where a major tipping point can be expected in 10 to 20 years. This is likely to occur when the increasing cost of fossil fuels (driven mainly by oil scarcity and carbon taxes) crosses over the decreasing cost of renewables (driven mainly by technological developments but also economies of scale). This levy presents an opportunity for Exxaro to lower its carbon footprint, thereby decreasing the amount of payable energy-related levies and taxes by relying on cleaner sources, for example co-generation or renewable energy.

CONCLUSION

Exxaro has a history of commitment to environmental and sustainable development since it was established in 2006. Sustainable development is not a peripheral 'add on' to its business but is embedded within the Exxaro brand, making it core to all operations. This creates an enabling environment for being proactive where sustainable development is concerned. The formation of the energy company, Cennergi, by Exxaro can be regarded as reactive to an increasing carbon footprint, energy security issues and other climate-related issues. However, it is also proactive where issues of a carbon constrained future, expected increases in coal costs, and even exhaustion of coal reserves are concerned. As already mentioned, the company is exploring other business ventures that will thrive in a low carbon environment, and that further affirms this conclusion. While presented here as a breakthrough, Exxaro's new energy company is still under feasibility studies. The benefits of the breakthrough initiative therefore have not been realised as yet but there is a high level of confidence that it will be a success given the commitment by the company. Furthermore, projections show that it is going to make a huge impact in both reducing carbon emissions and in paving way for the use of clean and renewable sources of energy in South Africa.

NOTES AND REFERENCES

- 1 Eberhard, E., 2011. The future of South African Coal: Market, investment and policy challenges. Working paper no. 100. *Programme on Energy and Sustainable Development*. Freeman Spogli Institute for International Studies: Stanford.
- 2 Exxaro Resources., 2010a. Annual Report. Exxaro Resources.
- 3 Ibid.
- 4 Cairns, P., 2011. The Investment Case – Exxaro Resources Ltd. Available at <http://www.moneyweb.co.za/mw/view/mw/en/page295165?oid=529634&sn=2009+Detail> [Accessed 13 July 2011].
- 5 Ibid.
- 6 Coking is the process of heating bituminous coal in the absence of oxygen to get rid of organic compounds and some sulfur gases. Coking coal is used in manufacturing steel where volatile-free and ash-free carbon is used.
- 7 Odendaal, N., 2012a. *Coal miner* Exxaro to submit five renewable energy bids. Available at <http://www.miningweekly.com/article/coal-miner-exxaro-to-submit-five-renewable-energy-bids-2012-02-23> [Accessed 25 February 2012].
- 8 Cairns, P., 2011. Op Cit.
- 9 Ibid.
- 10 Exxaro Resources., 2010a. Op Cit.
- 11 Ibid.
- 12 Exxaro Resources., 2008a. Communication of progress for the year ended 31 December 2008. Available at <http://www.unglobalcompact.org/system/attachments/2039/original/COP.pdf?1262614304> [Accessed 24 August 2011].
- 13 Exxaro Resources., 2010a. Op Cit. p. 92.
- 14 Nettleton, G. and Kutwaroo, K., 2010. Coal and climate change. Down to Earth Newsletter No. 85–86. Down to Earth. Available at <http://www.minesandcommunities.org/article.php?a=10513> [Accessed 25 February 2012].
- 15 Yilmaz, A. O. and Uslu, T., 2007. The role of coal in energy production – consumption and sustainable development of Turkey. *Energy Policy*, 35, pp. 1117–1128.
- 16 Mullard, B., n.d. Climate Change Background Paper: Mineral Resources. Available at http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0006/191238/Climate-change-and-mining_a-background-paper.pdf [Accessed 24 August 2011].
- 17 Coal and climate change facts., n.d. Pew Center on Global Climate Change. <http://www.pewclimate.org> [Accessed 11 August 2011].
- 18 Nkomo, J. C., 2005. Energy and economic development challenges for South Africa. *Journal of Energy in South Africa*, 16(3), pp. 10–20.
- 19 Haw, M. and Hughes, A., 2007. Clean energy and development for South Africa: Background data. Report 1 of 3. Cape Town: Energy research centre, University of Cape Town and the British High Commission South Africa. Available at <http://www.erc.uct.ac.za/Research/publications/07Haw-Hughes%20Clean%20energy%20&%20development%20-%201.pdf> [Accessed 11 July 2011].
- 20 Nkomo, J. C., 2005. Op Cit.
- 21 Economic sector review., 2009. Climate change risks and opportunities for the South African economy. Economic sector review: Mining and quarrying.

- 22 Eberhard, E., 2011. Op Cit.
- 23 Ibid.
- 24 Eskom., n.d. Guide to Independent Power Producer (IPP) processes. Available at <http://www.eskom.co.za/c/article/552/home/> [Accessed 13 October 2011].
- 25 Keating, M., 2001. Cradle to Grave: The environmental impacts from coal. A report by the Clean air task force. Boston: Clean Air task force.
- 26 Coal and climate change facts., n.d. Op Cit.
- 27 Camco and TIPS., 2010. Climate Change Risks & Opportunities for the South African Economy: An assessment of mitigation response measures. Available at http://www.climate-risk-and-opportunity.co.za/downloads/Full%20report%20&%20exec%20summary/Climate_Change_&_SA_Economy_201005.pdf [Accessed 11 August 2011].
- 28 Eberhard, E., 2011. Op Cit.
- 29 Lloyd, P. J., 2002. Coal mining and the environment. Coal mining and the environment. Final Proceedings of the International Conference on Coal and Environment IBA Durban, South Africa., (2002), pp. 8-9. Available at http://www.erc.uct.ac.za/Research/publications-pre2004/02Lloyd_Coal_environment.pdf [Accessed 13 October 2011].
- 30 Nkomo, J. C., 2005. Op Cit.
- 31 Camco and TIPS., 2010. Op Cit.
- 32 Eberhard, E., 2011. Op Cit.
- 33 Ibid. p. 36.
- 34 Department of Minerals and Energy., 1998. White Paper on the Energy Policy of the Republic of South Africa. Available at <http://www.info.gov.za/whitepapers/1998/energywp98.htm> [Accessed 15 December 2011].
- 35 Department of Environment Affairs., 2011. National Climate Change Response White Paper. Available at http://www.environment.gov.za/PolLeg/WhitePapers/national_climatechange_response_whitepaper.pdf [Accessed 15 December 2011].
- 36 Department of Minerals and Energy., 2003. White Paper on Renewable Energy. Available at http://www.energy.gov.za/files/policies/whitepaper_renewables_2003.pdf [Accessed 15 December 2011].
- 37 National Energy Regulator of South Africa., 2011. Review of Renewable Energy Feed – In Tariffs. NERSA Consultation Paper. Available at <http://www.nersa.org.za> [Accessed 7 January 2012].
- 38 Prinsloo, L., 2011. Coal road map to be released by mid-2012. Available at <http://www.miningweekly.com/article/coal-road-map-to-be-released-by-mid-2012-2011-06-21> [Accessed 07 January 2012].
- 39 Camco and TIPS., 2010. Op Cit.
- 40 Eberhard, E., 2011. Op Cit.
- 41 Ibid.
- 42 Singh, G., 2008. Mitigating environmental and social impacts of coal mining in India. Mining engineer's Journal. A paper presented during the 1st International Conference on Managing the Social & Environmental Consequences of Coal Mining in India. 19-21 November 2007, New Delhi.
- 43 Haw, M. and Hughes, A., 2007. Op Cit.
- 44 National Mining Association., n.d. Clean Coal Technology. Available at http://www.nma.org/pdf/fact_sheets/cct.pdf [Accessed 11 August 2011].
- 45 Cloete, R., 2008. Clean coal technologies in South Africa. *Cremer Media's Mining Weekly online*. Available at <http://www.miningweekly.com/article/clean-coal-technologies-in-south-africa-2008-09-05> [Accessed 11 August 2011].

Chapter 4

- 46 Mullard, B., n.d. Op Cit. pp. 1–2.
- 47 Business Report., 2011. Exxaro and SA's energy environment. Available at <http://www.nbi.org.za> [Accessed 9 October 2012].
- 48 Ibid.
- 49 Developed by author with inputs from: Business Report., 2011.
- 50 Business Report., 2011. Op Cit.
- 51 Ibid.
- 52 Exxaro Resources., 2010a. Op Cit.
- 53 Business Report., 2011. Op Cit.
- 54 Exxaro Resources., 2010a. Op Cit.
- 55 Business Report., 2011. Op Cit.
- 56 Exxaro Resources., 2010a. Op Cit. p. 114.
- 57 Business Report., 2011. Op Cit.
- 58 Odendaal, N., 2012b. Exxaro, Tata move power JV forward. Available at <http://www.engineeringnews.co.za/article/exxaro-tata-move-power-jv-forward-2012-03-05> [Accessed 7 March 2012].
- 59 Odendaal, N., 2012a. Op Cit.
- 60 Business Report., 2011. Op Cit.
- 61 Exxaro Resources., 2011a. Exxaro integrated annual report. Exxaro Resources. Available at <http://www.annualreports.com/HostedData/AnnualReports/PDF/EXXAF2011.pdf> [Accessed 10 October 2012].
- 62 25 Degrees in Africa., 2012. Mining group shines in CDP report. 25 Degrees in Africa Newsletter. Volume 7, Number 1 – Jan/Feb 2012. Available at http://www.25degrees.net/index.php/component/option,_zine/Itemid,146/id,1500/view,article/ [Accessed 10 October 2012].
- 63 Exxaro Resources., 2011b. Exxaro shines at CDP 2011 announcements. News release. Available at http://www.exxaro.com/content/media/newsReleasesNews.asp?Current_ID=318 [Accessed 10 October 2012].
- 64 BuaNews., 2012. Medupi helping build economy: Zuma. Available at <http://www.southafrica.info/business/economy/infrastructure/medupi-110612.htm#.UH1TbtRwuog> [Accessed 10 October 2012].
- 65 Exxaro Resources., 2011c. Exxaro a best performer in the 2011 JSE SRI Index. News release. Available at http://www.exxaro.com/content/media/newsReleasesNews.asp?Current_ID=317 [Accessed 10 October 2012].
- 66 Exxaro Resources., 2010a. Op Cit. p. 93.
- 67 Ibid.
- 68 Exxaro Resources., 2011d. Exxaro's energy, climate change, and renewable energy journey. SANEA Presentation. 12 October 2011.
- 69 South Africa National Energy Awards., 2011a. Award winners and commendations: Awards ceremony and gala dinner, 25 August 2011. Available at <http://www.sanea.org.za/CalendarOfEvents/2011/SANEAEnergyAwards/AwardWinners&Commendations.pdf> [Accessed 10 October 2012].
- 70 Exxaro Resources., 2010b. Wind power / powering community development. News release. Available at http://www.exxaro.mobi/allnews.asp?Current_ID=277 [Accessed 10 October 2012].
- 71 Exxaro Resources., 2010a. Op Cit. p. 131.
- 72 Ibid. p. 93.
- 73 Exxaro Resources., 2009a. Annual Report.
- 74 Exxaro Resources., 2010a. Op Cit.
- 75 Exxaro Resources., 2010a. Op Cit. p. 94

- 76 South Africa National Energy Awards., 2011b. Short-listed candidates: Awards ceremony and gala dinner, 25 August 2011. Available at <http://www.sanea.org.za/CalendarOfEvents/2011/SANEAEnergyAwards/Short-listedCandidates.pdf> [Accessed 11 October 2012].
- 77 South Africa National Energy Awards., 2011b. Op Cit.
- 78 Exxaro Resources., 2008b. Annual Report.
- 79 Eberhard, E., 2011. Op Cit.
- 80 Goldstein, M., 2009. An argument for the Introduction of IPPs in the South African Electricity Industry. Frost & Sullivan Market Insight, November 2009. Available at <http://www.frost.com/prod/servlet/market-insight-top.pag?docid=184768028> [Accessed 3 November 2011].
- 81 Winkler H., 2005. Renewable Energy Policy in South Africa: Policy options for renewable electricity . *Energy Policy*. 33, pp. 27–38.
- 82 Goldstein, M., 2009. Op Cit.
- 83 Haw, M. and Hughes, A., 2007. Op Cit.
- 84 Eskom., 2010. Clean coal technologies. Fact sheet, Eskom news, revision2. Available at <http://www.eskom.co.za> [Accessed 5 November 2011].
- 85 25 Degrees in Africa., 2012. Op Cit.
- 86 Leahy, S., 2008. Climate change: Bio-fuels worse than fossil fuels. Available at <http://ipsnews.net/news.asp?idnews=41119> [Accessed 15.August 2011].
- 87 Sparks, D and Mwakasonda, S., 2006. Energy and the environment (Chapter 7). In Energy policies for sustainable development in South Africa: Options for the future, ed. H. Winkler, 88–101. Energy Research Centre. Cape Town: University of Cape Town.
- 88 Business Report., 2011. Op Cit.
- 89 25 Degrees in Africa., 2012. Op Cit.
- 90 Business Report., 2011. Op Cit.
- 91 25 Degrees in Africa., 2012. Op Cit
- 92 Business Report., 2011. Op Cit.
- 93 Ibid.

5

From methane curse to carbon trading at Gold Fields

Letitia Greyling

ABSTRACT

Gold Fields' vision of being 'the global leader in sustainable gold mining' is a clear indication of what strategic drivers have been identified to differentiate it from other gold mining companies. For Gold Fields it is a strategic imperative to be able to flourish in a low carbon economy. As will be highlighted in this chapter, the company is recognised as a leader in the local mining industry when it comes to the management of carbon-related issues. This mining group recognises and understands the changes in the world economy around restructuring the current carbon-based economy to a low carbon one. Furthermore, it realises that these changes will impact on aspects of their business, ranging from carbon pricing in energy to stakeholder perceptions and views.

The company has therefore started implementing various initiatives within the organisation to facilitate and manage this transition process. Amongst others, they have established key forums to deal with carbon-related management issues, guided by a group-wide Carbon Management Strategy that was reviewed and updated in 2011. Gold Fields uses the opportunities presented by the sophisticated market mechanisms that have developed around the carbon credit market. In 2010, the group became the first gold mining company in the world to utilise and sell Certified Emissions Reductions (CERs). The CERs refer to the financial securities used to trade reduced carbon emissions in a carbon trade deal. These funds were used to finance Gold Fields' Beatrix Mine Methane Gas Project, a flagship breakthrough under discussion in this chapter. In this project, the company set the scene for using carbon credits to fund this and other greenhouse gas (GHG) and energy-saving projects at Gold Fields. The Beatrix case study speaks directly to how an innovative carbon credit project that showcases an organisation's low carbon business case can play a role within a low carbon and green economy.

INTRODUCTION

From methane curse to carbon trading, there is a clear green economy and low carbon breakthrough that emerged at Gold Fields' Beatrix Mine situated near Welkom in the Free State province of South Africa. Gold Fields mining company was established more than 120 years ago, but in 1998 it transformed into the organisation we know today as a result of the consolidation between gold assets of Gold Fields South Africa Limited and Gencor Limited. Today, Gold Fields is the fourth largest gold-producing mining company in the world, and one of the largest un-hedged producers with operations and exploration sites across the globe, in South Africa, Peru, Ghana, Mali, Finland, Kyrgyzstan, Philippines and Australia.¹ The company's South African operations are mainly deep gold mines, making it environmentally a high-impact industry. This presents challenges that involve legacy issues and frequently require complex solutions.

Although not without challenges, the organisation has been placing sustainability, and its related responsibilities, as a top priority for several years. In its efforts to act ethically and responsibly, the organisation annually participates (amongst others) in the Johannesburg Stock Exchange Social Responsibility Index (JSE SRI). Gold Fields was awarded the 'Best Performer' within this Index in 2011, having been amongst the best performers previously since the inception of the SRI in 2004.² In the latest 2011 Carbon Disclosure Leadership Index (CDLI), an index that ranks companies listed on the JSE on their carbon emissions' disclosure and reporting, the organisation was the sole winner, having come in joint-first in the 2010 review (up from the fifth position they held in both 2008 and 2009).³ For companies to qualify in the 2011 CDLI, they had to reduce their GHG emissions by at least 2,65 per cent from 2010, making the entry requirements and criteria stricter than previous years. Gold Fields was one of only two companies qualifying for this inclusion in the 2011 JSE 100 carbon performance leadership index.

Internationally, Gold Fields (also listed on the New York Stock Exchange, National Association of Securities Dealers Automated Quotations (NASDAQ) and Dubai: GFI has been ranked fourth in the mining sector of the 2011 Dow Jones Sustainability Index (DJSI).⁴ The DJSI is one of the most recognised measures of the sustainability performance of listed companies on an international platform. The announcement was made at the 2012 World Economic Forum gathering in Davos and Gold Fields now finds itself ranked in the top 5 per cent of global resource companies when it comes to sustainability practices, and the top South African-listed mining company on the DJSI. In responding to the accolade, Gold Fields chief executive officer, Nick Holland, had this to say:

We have set a strong performance in the DJSI as a milestone on our journey to be the global leader in sustainable gold mining, so our 4th place ranking in our first assessment indicates that we are making good progress. Implementing sustainable business practices at all our operations is essential if we are to succeed in being the gold company of choice for investors, communities and government.⁵

Given that it is the first time that Gold Fields participated in the DJSI assessment, it not only is a feather in their cap to get international recognition of their efforts, but it also serves as a reassuring confirmation that the assessments done by South Africa's JSE SRI yielded similar results when it came to considering sustainable and responsible corporates.

It is therefore not surprising that risk (and opportunity) management within this organisation is highly valued and considered as one of the top strategic priorities. This includes impacts identification, mitigations and opportunity analysis within the climate change arena and the carbon management sphere. The company has been voluntarily participating in the Carbon Disclosure Project (CDP) since 2008. This has been done not only as a mechanism to show transparency, share information within the broader stakeholder domain and improve the traditionally negative connections associated with extractive industries, but also from a business prerogative perspective to fundamentally understand their business better and identify risks and opportunities relating to improved operational efficiencies and effectiveness. As an example, the company's total carbon emissions for the year 2010 amounted to 7 million tonnes, compared with the 7, 4 million tonnes of emissions in 2009 and 2008.

Gold Fields' vision of being 'the global leader in sustainable gold mining'⁶ is a clear indication of what strategic drivers have been identified to differentiate it from other gold mining companies. For Gold Fields it is a strategic imperative to be able to flourish in a low carbon economy. As highlighted in this section, the company is recognised as a leader in the local mining industry when it comes to the management of carbon-related issues.

LOW CARBON AND GREEN ECONOMY IN THE SOUTH AFRICAN MINING SECTOR

South Africa's view on a green economy was the centre of discussion at its inaugural Green Economy Summit held in 2010. It was then defined as 'a sustainable development path based on addressing the interdependence between economic growth, social protection and natural ecosystem', with its more formal definition viewed as a 'system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks or ecological scarcities'.⁷ Although it is a definition that has certainly faced criticism and is not devoid of concerns about its message, it does infer decoupling of economic growth and the utilisation of resources and environmental impacts, making it characteristic of increased investment approaches in green sectors, through the support of enabling policy transformations.

The Green Economy Summit was convened under the theme 'towards a resource efficient, low carbon and pro-employment growth path'.⁸ For purposes of this chapter, the focus was directed towards the low carbon aspect of green economic development in an

effort to understand what businesses, specifically the mining sector, was doing in terms of carbon management practices and the role they play in the South African move towards a greener, low carbon economy. The following areas relating to mining and minerals were emphasised during the 2010 Green Economy Summit.⁹

- As a possible policy intervention, it was identified that the national Department of Mineral Resources (DMR) initiated a comprehensive stakeholder engagement process to involve all mining sector role players in an effort to promote the use of modern technologies that reduce carbon emissions, improve energy efficiency and ensure environmental integrity. This is a tall order given the various legacy issues associated with more than a century's mining activities, but certainly a step in the right direction to facilitate discussion and sharing of ideas and ideals on the role mining can and should play in a green economy. The DMR focus areas around carbon and energy management through technology improvements dovetails well with the discussions in this chapter.
- From a regulatory and policy framework perspective, it was acknowledged that South Africa would need to reconsider certain aspects in the medium to long term relating to its export base market. This is because approximately 66% of the country's export base (predominantly in mining and mineral-related products) is carbon-intensive. Specifically, the mining sector had to investigate if and how the transition into a low carbon and green South African economy will affect labour and job losses within the sector.
- The Human Development Index showed that the demand for mining of minerals will exceed supply. Hence aspects around resource conservation and management needed to be investigated. Although issues such as waste production continue to pose significant challenges, opportunities could also present themselves for viable economic ventures. Again, the case study discussed in this chapter clearly indicates how improved resource utilisation (energy) can translate into substantial financial benefits.
- Similar to the above, mining's negative impact on the environment and water resources and quality (especially acid mine drainage associated with [historical] gold mining activities) drew attention at the Summit. Concerns around resource constraints, lack of capacity, monitoring requirements and assessment of water quality (and not only water quantity) were raised for consideration of moving towards a green economy without economic activities negatively impacting the relevant environment.

With mining's critical role being regarded as one of the five pillars of sustainable development, at a 2010 review of the United Nations (UN) Commission of Sustainable Development,¹⁰ the South African Minister of Mineral Resources, Ms Susan Shabangu, called for green economic approaches to mining. She highlighted that:

‘... We need to ensure that mining does not leave behind a mix of negative social, environmental and human legacies. To achieve this, we have to engage with the issues of the ‘green economy’, the buzzword globally is about the ‘greenification of the mining sector’. I firmly believe that this new approach is a global imperative, not only for sustainable mining but also for sustainable development in general’.¹¹

All of this was perhaps most eloquently summarised by President Jacob Zuma in his keynote address at the 2010 Green Economy Summit. The keynote address set the scene for where South Africa needed to go in terms of addressing environmental ills, especially through the low carbon and greener economy. President Zuma noted that:

‘Ecosystem failure will seriously compromise our ability to address our social and economic priorities. Natural resources are national economic assets, and our economy depends heavily on energy and mineral resources, biodiversity, agriculture, forestry, fishing and tourism. In short, we have no option but to manage our natural resources in a sustainable way. We have no choice but to be eco-friendly. We have no choice but to develop a green economy.’¹²

With this case study, it is hoped that innovative, creative and best practice approaches to more responsible and sustainable mining will continue to help deliver on the ideals of a low carbon and greener economy.

DRIVING THE GOLD FIELDS’ BUSINESS CASE TOWARDS LOW CARBON

Drivers towards a low-carbon approach have an interesting connotation with regards to Gold Fields. Even though the organisation started off their exercise, strategy and initiatives from a risk-based tactic, it seems to have also morphed into an opportunity approach – perhaps unbeknown to the company and, therefore, completely by default. Once again this illustrates the fundamental benefits associated with adequate risk management perspectives, where operational efficiencies and effectiveness are not the only improvements envisaged but also possible opportunities for (and beyond) mitigation. What started off as an organisational risk soon translated into a business opportunity. This was evident, amongst others, in an increase in Board interest after the Beatrix Cleaner Development Mechanism (CDM) project and associated Emission Reduction Purchase Agreement (ERPA).¹³ This is discussed further in subsequent sections of this chapter. For Gold Fields, the key drivers in the pursuit of lower carbon-intensive operations include, among others: regulatory regimes, carbon dioxide impacts reduction, financial risks, physical impacts and market implications. These and other drivers are discussed further in the following sub-sections.

REGULATORY REGIME

Gold Fields is well aware of the country's Long-Term Mitigation Scenario (LTMS) strategy¹⁴ pledges made with regards to local emissions reductions, and the advancement of South Africa's carbon tax approach as one of the avenues for achieving some of these reductions. Similarly, global discussions and agreements around climate change mitigation and adaptation forced the company, as an international organisation, to start assessing their business vulnerabilities and investigate approaches that could be adopted to utilise and support these efforts.¹⁵

CARBON DIOXIDE REDUCTION IMPACTS

With South Africa's electricity primarily driven by Eskom's coal-fired power stations with high carbon intensities, all organisations using energy from this national grid are exposed to carbon emission reduction impacts. Similar to many of its suppliers, electricity accounts for approximately 15 per cent of Gold Fields'¹⁵ total operating costs in South Africa, and therefore the company has to start understanding the risk of increased costs and possible increased demand for electricity within their current and future operations. Their own carbon footprint of approximately five million tonnes (excluding mine methane emissions) would also be subject to reduction targets, thus increasing the company's tax burden even further.¹⁶

FINANCIAL RISKS

Linked to carbon dioxide reduction impacts, Gold Fields assessed the announced Eskom tariff increases of 2010 and associated emission reduction impacts from the power utility in terms of financial impacts on the mining company. With an increase in energy cost and emission reduction requirements, this translates directly into an increase of the real cost of producing an ounce of gold – or what is referred to as the Notional Cash Expenditure (NCE) per ounce of gold.¹⁷ The current 2c/kWh¹⁸ tax on non-renewable electricity already equates to R20/tonne of CO₂e, and taking into account the carbon tax on vehicles proposed in the LTMS, the cost could reach R80/tonne of CO₂e in 2012. This would increase the company's NCE by around 3,5 per cent under the worst-case scenario options.¹⁹ This brought home the message that climate change and its impacts can no longer be viewed as purely an environmental risk, but has moved to an issue of commercial significance.

PHYSICAL IMPACTS

Gold Fields conducted various risk assessments around the physical impacts likely to be brought about by climate change. The likely impacts ranged from changes in rainfall patterns and temperature, to how these translated into infrastructure impacts that include,

for example, underground cooling requirements, tailings dam designs and costs. These, therefore, also explain an additional driver for the business to consider lower carbon alternatives within their sphere of influence so as to ensure that they play their part in adequately mitigating local and global emissions and adapting their operations.²⁰

MARKET AND SUPPLY CHAIN IMPLICATIONS

With jewellery manufacturing continuing to absorb a large portion of the gold produced, changes in this demand due to climate change impacts (for example adverse effects on consumers' lifestyles and disposable income) and other demand opportunities (for example, gold's position as a long-term safe haven and investment option) can also drive Gold Fields' position in, and incentive towards, a low carbon economy.²¹

From a supply chain perspective, various materials that result in carbon emissions are used in gold mining operations. The materials include steel, timber, chemical reagents and cement. These industries are also vulnerable to impacts from climate change and legislative requirements, providing another indicator for Gold Fields to understand their own supply chain carbon risks and opportunities better. This, therefore, indirectly acts as a driver for the mining company to consider low carbon alternatives beyond the scope of their own activities, with Gold Fields already expanding their carbon footprint calculations to include the supply chain.²²

TECHNOLOGY CHANGES

Gold Fields evaluate new technologies on a continuous basis, as they strive to improve their adaptation to a changing environment. These technologies focus mainly on energy efficiency and alternative sources of energy, allowing the organisation to better deal with their expenses in this regard, once carbon is priced in the local or global economy.²³ Understanding the risks associated with new technology (which is often the case considering its limited exposure to implementation in various situations) and the challenge of accessing gold in lower grades and deeper deposits with less energy, strengthens the business case for being a leader in a low carbon economy – instead of being forced in a reactive manner to follow competitors and comply with legislative requirements.²⁴

SOCIAL RISK

Social perceptions about climate change issues are already changing and will continue to do so as the impacts of climate change manifest themselves at local and global levels. Gold Fields acknowledged that they need to anticipate these changes and be able to respond accordingly, to ensure business survival in the long term. Mining plays a large role in mining communities, and therefore the risk of mine closures (either due to declining resources, demand, economic factors, or other reasons) will directly impact

the surrounding communities in mining areas, as well as regions from which labour is drawn. With this as background, the considerations for lower carbon strategies and operations again move beyond the scope of the company's direct impacts and should reflect all organisations' social responsibility with regards to embracing a green economy.²⁵

REPUTATIONAL RISKS

The public's awareness around climate change is increasing. Since Gold Fields operates in a large energy consuming sector, they have to consider their reputational risk if viewed as an irresponsible corporate and as not moving towards improved use of energy, natural resources and fossil fuels efficiently. Another key group of stakeholders interested in how organisations are dealing with climate change challenges seems to be investors and securities regulators who are also starting to place emphasis on these concerns and companies' responses.²⁶ By extension, it could be argued that any reputational damage could result in Gold Fields' ability to secure financing to fund future projects being compromised. However, at the same time Gold Fields' ability to raise carbon credit funding to finance key energy projects is also viewed by investors as a positive development and indicates that the company is more ready than other mining companies to deal with the potential and actual impact of carbon taxes, amongst others.²⁷

UNKNOWN CONSIDERATIONS

These unknown risks associated with climate change relate mainly to continuity challenges. As with the majority of organisations, Gold Fields is also used to planning its business on projections and assumptions from past practices and lessons. This is not likely to hold true given the number of unknowns associated with climate change and the exposure to uncertainties related to rapid changes associated with climate change in the environment (physical, regulatory and other) in which the company operates.²⁸ Reminiscent of the National Environmental Management Act²⁹ (NEMA) principles, employing precautionary and preventative approaches to the organisation's strategic and operational ambitions can be further viewed as drivers towards low carbon mining.

As with many risks, the above also represent opportunistic situations and necessary drivers for the organisation to move into a low carbon and green economy.

ENABLING THE ORGANISATION FOR LOW CARBON MANAGEMENT

Gold Fields recognises and understands the changes in the world economy around restructuring the current carbon-based economy to a low carbon one. Furthermore, it realises that these changes will impact aspects of their business, ranging from carbon pricing in energy to stakeholder perceptions and views. The company has therefore

started implementing various enablers within the organisation to facilitate and manage this transition process.

The company manages carbon matters at the highest level, with the board overseeing climate change risks and issues through the established Safety, Health and Sustainable Development (SHSD) Committee.³⁰ The Board of Directors and Executive Committees are kept informed of the progress and status of the energy efficiency and CDM projects through updates at committee meetings held quarterly. Quarterly reports have contained a section on climate change, emissions and/or carbon management since 2005.

To ensure climate change and carbon issues are dealt with in an integrated and formal manner, Gold Fields started off in 2009 with the development of their Carbon Management Policy statement which speaks to their strategic ideals (see Box 5.1 below).

Box 5.1 Gold Fields Carbon Policy statement³¹

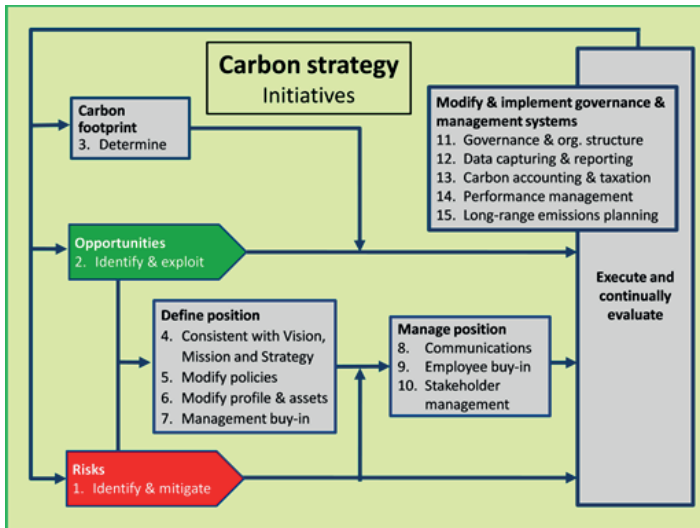
Gold Fields Limited recognises that global warming and associated climate change is a reality that requires global action. Considering our vision of being the global leader in sustainable gold mining, Gold Fields Limited is committed to contributing to a global solution through the deployment of responsible strategies and actions.

To attain the overall vision, the company is committed to:

- Designing and implementing strategies that reduce the carbon footprint of the company
- Determining the risks that climate change may present to the company
- and assigning appropriate actions to mitigate such risks
- Accurately determining our carbon footprint and providing comprehensive disclosure on carbon related issues
- Complying with applicable legal requirements and with other requirements to which the organisation subscribes, that relate to carbon management
- Continuously improving the energy efficiency of our operations
- Identifying and pursuing all opportunities related to climate change
- Identifying and deploying carbon friendly technologies where feasible
- Encouraging business partners and suppliers to adopt similar principles
- Establishing an appropriate level of awareness in the organisation in terms of carbon management.

Gold Fields' detailed Carbon Management Strategy grew out of this policy statement that was presented to their Executive Committee (and accepted), with initiatives summarised in Figure 5.1.

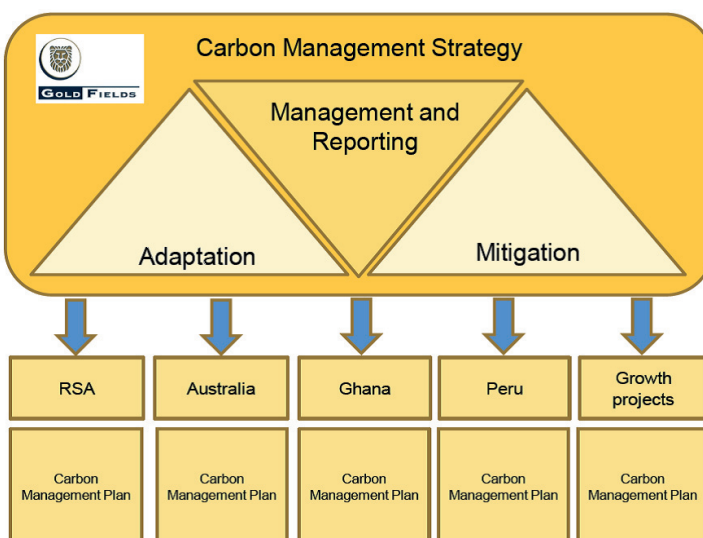
Figure 5.1 Gold Fields' initial Carbon Strategy initiatives



Source: Gold Fields³²

The strategy was reviewed in 2011, with its roll out imbedded in carbon management plans that had to be prepared per region. The plans formed the basis of the tactical interventions that would prepare the company to meet its business challenges associated with a low carbon economy.

Figure 5.2 Gold Fields' Carbon Management Strategy, reviewed and adopted in 2011



Source: Gold Fields³³

Gold Fields' updated Carbon Management Strategy has three major focus areas namely: management and reporting; mitigation of GHG emissions; and adaptation to the impacts of climate change (as illustrated in Figure 5.2). Management and Reporting focuses on carbon accounting, performance reporting and communication. Carbon budgeting plays an important role in this respect. This is closely integrated with energy efficiency targets. Mitigation of GHG emissions focuses on twin aspects. The first is to mitigate carbon pricing risks. Gold Fields accepts that carbon will be priced into the world economy. This is going to have an impact on the cost structure and NCE of all the current and future operations. Mitigation of GHGs emitted directly and indirectly from Gold Fields operations will mitigate the risk on their cost structures. The second leg of the mitigation strategy focuses on the benefit that can be gained from GHG offset projects through the generation and sale of carbon credits. Adaptation to the impacts of climate change focuses on managing the climate change risk to which Gold Fields is exposed.

As part of the strategy development, climate change risks and opportunities were identified and the financial implications to 'business as usual' were identified and quantified. These were to be included in the company's overall risk management processes. This also formed an integral part of Gold Fields' daily business cycle that needed to be aligned with (and supportive of) the organisation's visions, values and goals. Table 5.1 summarises the alignment approach.

Table 5.1 Summary of Gold Fields alignment approach

Element	Detail	Carbon Management Strategy Alignment with Company Vision, Values and Goals
<i>Vision</i>	To be the global leader in sustainable gold mining.	Proactively addressing the over-arching environmental challenge of our times indicates clearly the link to the group's vision.
<i>Values</i>	Safety: If we cannot mine safely, we will not mine.	Addressing climate change will assist the group to mitigate risks such as flooding and high temperatures that are safety related.
	Responsibility: We act responsibly and care for the environment, each other, and all of our stakeholders – our employees, our communities and our shareholders.	Proactively addressing the over-arching environmental challenge of our times indicates clearly the link to the group's vision.
	Honesty: We act with fairness, integrity, honesty and transparency.	The commitment to open disclosure, and active communication, with regard to climate change supports this value.
	Respect: We treat each other with trust, respect and dignity.	The implementation of carbon emission mitigation strategies reduces the environmental impact on communities and other stakeholders.
	Innovation: We encourage innovation and entrepreneurship.	The Carbon Management Strategy will drive innovation within the group by the very nature of the challenges it presents and the development of the Low-Carbon 2050 Road Map.

Element	Detail	Carbon Management Strategy Alignment with Company Vision, Values and Goals
	Delivery: We do what we say we will do.	The Carbon Management Strategy is built around the need for plan development and the development and assessment of targets to ensure performance and delivery.
Goal	Five million quality gold ounces, in production or development by 2015.	The strategy will support the achievement of this goal by assisting the group to continue its focus on the security of supply for key inputs, in this case energy and water.

Source: Gold Fields³⁴

The integration of the Carbon Management Strategy within the broader strategic framework of Gold Fields is further explained in Figure 5.3.

Figure 5.3 Integrating carbon management into Gold Fields' overall strategy



The strategy provides a framework for including climate change and carbon-related issues into business planning models and decision-making processes within the organisation. With energy supply and its pricing being important matters in all its operations, Gold Fields specifically invested substantial amounts of financial and human resources in energy efficiency and saving initiatives across their operations; particularly in South Africa, with Eskom tariffs rising by 25 per cent per annum between 2010 and 2012. The rewards have been evident from the mere fact that the company's electricity consumption locally declined by 5 per cent (approximately 30 MW) to below 600 MW in the 2010 financial year.³⁵ The company expected similar declines in 2011. Gold Fields in South Africa now uses around 15 per cent less electricity against the Eskom base-load established after the 2008 electricity outages.³⁶

The company also recognised the importance of involving employees who play fundamental roles in achieving all the objectives. This is done by employees taking ownership of responsible carbon-related management programmes and initiatives, reacting and adhering to the group's carbon policy and principles, and integrating carbon management issues into their everyday practice.

LOW CARBON BREAKTHROUGH FOR HARD ROCK MINING

The often complex market mechanisms associated with the carbon credit market presented opportunities for Gold Fields on which to capitalise. Internationally, they became the first gold mining company (in 2010) to use and sell CERs. These refer to the financial securities utilised in the trading of reduced carbon emissions, through a carbon trade deal. The funds they gained from these trades financed the Beatrix Mine Methane gas project – indisputably, the flagship breakthrough discussed in this chapter. Gold Fields shows how carbon credits can fund this and other GHG and energy saving projects within their organisation, and this case study highlights how innovative projects on carbon credits can play a role towards a low carbon and greener economy.

Beatrix Gold Mine is a deep-level gold mine situated near Welkom in the Free State Province and has the highest methane emission rate of any South African gold mine. Methane escapes from deep-rooted sources within the geological features such as faults, dykes and fissures. During the course of normal mining operations, this highly explosive gas (which is also a potent GHG) is unlocked into the mine atmosphere where it is diluted with the air ventilation to below its explosion limits, before being released into the atmosphere. The total emission rate for methane at Beatrix is around 1 600 l/s, with the south section of the mine accounting for roughly 1 000 l/s.³⁷ This makes mine safety a significant concern especially when the methane accumulates as it has done in the past. A number of underground mining explosions have occurred previously within this region, with Beatrix being no exception.

Following the last explosion in 2001,³⁸ Gold Fields subsequently launched an investigation and various recommendations were made, two of which were to consider extracting the gas for improved mine atmosphere safety, and to require special operating procedures in designated hazardous locations. A number of these locations have since been declared and the mine now boasts a well-executed methane management system for risk control and employee safety as part of this flagship project. This extraction system was constructed to capture and remove 400 l/s methane released in the mine's south section, considering that it was not possible to capture all the methane gas associated with the mine due to the mining operations layout and related methane intersections. Focusing on specific working areas with high methane emission rates made business sense.

The average methane concentration (percentage methane per volume) of the gas intersected at source is 85 per cent, varying from 82 per cent to 90 per cent at different

locations within the mine.³⁹ Other hydrocarbons emitted were considered negligible and not included in calculations. Such high methane concentrations not only raised concerns for mine and employee safety, but also for impacts relating to climate change. Methane is one of the six gasses included in the Kyoto Protocol, under the United Nations Framework Convention on Climate Change (UNFCCC), as a powerful GHG. It has a Global Warming Potential (GWP) of 21 over a 100-year period, or in simple terms, contributing 21 times more to global warming compared to carbon dioxide (CO₂) over this amount of time.⁴⁰ Therefore, benefits around reducing this safety concern could also lead to mitigating the mine's GHG emissions if carefully considered. Methane flaring was an option, where the gas can be burned, releasing mainly CO₂, water and heat, thereby making it an emission of lower global warming potential. This resulted in the project being developed and implemented as a carbon credit under the CDM of the Kyoto Protocol, aiming to capture and destroy the methane.

After two years of working closely with a carbon project development firm (Promethium Carbon) to develop and register this CDM project, the Project Design Document (PDD) – a project registration requirement – was approved by the UNFCCC in October 2008, with registration under the Kyoto Protocol CDM in April 2011.⁴¹ As mentioned previously, this made Gold Fields the first company to register a hard rock CDM project in the world, allowing them to sell their CERs. CERs are awarded for every tonne of CO₂ saved during a company's production process, traded internationally and often bought by developed-world companies to assist them meeting their own carbon emission requirements. Gold Fields will therefore receive 21 CERs for each tonne of methane captured under this project, as explained by the Global Warming Potential (GWP).⁴² Carbon credits are pre-paid forward contracts, with emissions being traded and settled in euro. Gold Fields will sell 1,7 million CERs (to be paid out in six-monthly instalments and after the first year, in annual instalments) to European energy trading company Mercuria Energy Trading South Africa under forward contracts that run until 2016.⁴³

This CER contract is worth an estimated R200 million at CER values of around 10 euro/tonne of CO₂ and associated exchange rates, making the project attractive with a two-year payback (the initial project outlay of R54 million for the gas flaring phase).⁴⁴ The flaring operations form part of this project's first phase, as mentioned previously, for the installation of a methane extraction system underground and flares above the surface. Plans for Phase Two involves the construction and installation of a power plant to use the gas for electricity generation, furthermore contributing to climate change mitigation and the company's own energy security through the conversion of this GHG into a valuable resource. This second phase is estimated to cost another R45 million and will produce 4 MW of electricity. According to Professor Jan du Plessis, the company's Group Environmental Engineer responsible for these projects,

Electricity at Beatrix will be generated by combusting the mine methane in internal combustion engines. The project design is to install four engines with an installed capacity of 1,345 MW each. The electricity generated will displace grid electricity and excess

methane that cannot be handled by the engines will be flared.⁴⁵ A series of photos depicting the Beatrix mine flare supplied by Gold Fields are shown in Figures 5.4 a–c.

Figure 5.4a Beatrix Mine flare



Figure 5.4b Beatrix Mine flare



Figure 5.4c Beatrix Mine flare



The European magazine *Energy Risk* awarded Gold Fields' project and transaction as the 'Deal of the Year' for 2010.⁴⁶ This was during its annual energy risk awards. The award came in recognition of a global breakthrough, for the project was the first carbon credit project of its size undertaken by a gold mine. This project will reduce the mine's carbon footprint by an estimated 28 per cent and reduce their energy consumption by around 5 per cent.

The Beatrix development is merely the first of a number of carbon projects being investigated to boost Gold Fields' sustainable mining practices. The business case for this project is clear and innovative. The revenue generated by the

carbon credits has enabled Gold Fields to extract the methane at source, preventing it from entering the mine ventilation system, and thereby improving mine safety. This has also allowed a simplified process of selling carbon credits, generating more revenue for the company, contributing to climate change mitigation (and environmental benefits),

improve its reputation as an innovative and responsible corporate (especially when considering the awards and acknowledgements they have already garnered) and, overall, improve the company's understanding and management of its risks and opportunities.

CHALLENGES ASSOCIATED WITH THE BREAKTHROUGH

There were a number of design and construction challenges that had to be faced for Beatrix Phase I project. This was associated with the fact that appropriate methods and procedures had to be put in place in order to extract and transport the methane effectively from underground to the mine's surface, bearing in mind that the emitters are roughly 3 600 m away from the mine shaft, at a depth of 860 m. Additional technical considerations were around the requirements for the type of column used for transportation of the methane, the loss of pressure over the system, the safety systems required to address the various risk factors associated with the methane transport, and appropriate pumping system for the gas extraction to the surface. The system operates under negative vacuum provided by two surface blowers, delivering the emissions to a flare capable of burning off 450 l/s of methane.

The CDM registration process was also fraught with challenges and there were major difficulties in obtaining validation from the UNFCCC's CDM Board, especially considering the pioneering and unique nature of the project. Although methane flaring and its methodology is fairly well understood and recognised, Gold Fields had to create their own methodology for methane extraction, specifically from gold mines. This meant that the company was not allowed to use the coal methodology that they initially proposed, resulting in their first proposal being rejected. The company then developed two methodologies for re-submission in order to obtain permission from the UNFCCC methodologies panel; hence getting these approvals accounted for the larger portion of the time, since they were given the go-ahead from Gold Fields management.

However, by far the most arduous challenge was getting top management buy-in. The idea was first suggested in 2002 by Du Plessis (Gold Fields Group Environmental Engineer) after his involvement in the coal industry.⁴⁷ This is where he had first been exposed to methane extraction in Australia and the United States of America (US). However, at that stage there was no true commercial case for the project, and only after the Kyoto Protocol came into force in 2005 did this opportunity reawaken. Yet, changing attitudes towards CERs within South Africa remained a challenge and convincing management was difficult.⁴⁸ The real value of CERs was not apparent and required numerous awareness raising sessions and discussions, both within the company and government. Yet the steep learning curve for all parties involved has now yielded results, making it hopefully easier for future similar projects within the company and South Africa to be permitted, and innovative new ideas implemented.

PLANNED FUTURE PERSPECTIVES IN A LOW CARBON ECONOMY

Gold Fields' immediate focus is on the roll-out of carbon management plans that will assist in meeting the carbon reduction targets. The company also has detailed energy management plans per region and per operation, focusing primarily on reducing their electricity footprint and improving diesel-use efficiency. Energy saving initiatives remain a top priority and have gained increased commercial viability through the use of carbon credit to finance these projects. There are 10 potential projects identified in the South African region of operations, which could yield savings in excess of 600 000 tonnes of CO₂-e per annum if successfully developed.

Apart from the Beatrix Mine Methane Project's second phase (electricity generation) to save an estimated 2 000 tonnes of methane (translating into 42 000 tonnes of CO₂-e), the following South African projects are also lined up and at different stages of development:

- **Renewable energy at Kloof-Driefontein Mining Complex (KDC) West:** A study is currently underway for a renewable energy project at KDC that could generate 5 MW in the first phase and has the potential to go up to 50 MW energy generation in subsequent phases.
- **Implementation of Hard Ice49 at KDC East in collaboration with Mitsubishi:** This project has a projected cost of R80 million and estimates to reduce energy consumption at the Kloof operations by 53 GWh per annum. The Kloof Ice Chiller Project, currently undergoing validation, utilises hard-ice technology for underground mine cooling.
- **Implementation of high energy efficient fans⁵⁰ at all of the South African operations as part of a Demand-Side-Management (DSM), in collaboration with MechCaL and National Power:** The replacement of auxiliary in-line fans with new improved technology patented ones. This was first piloted at one of the shafts at KDC and is now being rolled out to all shafts at KDC to eventually replace all 1 147 existing fans. These new fans use 33,5 kW to provide the same airflow as a 45 kW fan, which amounts to an energy saving of 15,4 MW per annum (roughly 2,5 per cent of the company's annual electricity consumption).
- Other emissions-related initiatives being considered are recovering waste heat from air compressors, energy efficiency projects under DSM such as the so-called hydro-hoisting, using the Three Chamber Pipe Feeder systems.

There is also a renewable energy project based on the use of biomass to generate initially 10 MW of electrical power in Ghana, in collaboration with Nedbank, Nollen and TW2E and various other initiatives for Gold Fields international operations. Their Australian operations fall under the newly enforced carbon taxing regime adopted in that country.⁵¹ Hence, Gold Fields will investigate various options to help leverage their carbon reduction

initiatives in Non-Annex 1 countries to assist in reducing the tax burden of this new regime.

CONCLUSION

The regulatory regime around climate change and a low carbon economy will be a space to watch and respond to. Many of the decisions and ideals established at the UNFCCC's COP17 meeting in December 2011 will need to still be translated into action and initiatives. Business will play a major role in making many of these a reality. Mechanisms for technology and initiatives such as the Green Climate Fund⁵² will most certainly provide opportunities for improved access to finance, knowledge and technology even though there might still be uncertainty within the business community as to how they engage, benefit or contribute in these areas. According to the National Business Initiative (NBI),⁵³ continued engagement and discussion is one of the ways to facilitate this. NBI's CEO Joanne Yawitch called for business to be proactive. He also highlighted the importance of carbon mitigation, as national mitigation targets will impact business directly and will entail rigorous monitoring, reporting and systems to verify carbon reduction efforts.

As Gold Fields has innovatively demonstrated, with risk and even a level of uncertainty, there are also opportunities to be realised in the drive for a low carbon economy. All organisations are new travellers on this journey toward a low carbon economy. This applies both in South Africa and globally, and Gold Fields has certainly started to adapt and respond in an intelligent way to improve their business from a variety of angles in order to move toward lower carbon operations, and maximising on opportunities in this regard.

NOTES AND REFERENCES

- 1 Gold Fields., 2008. Gold Fields Overview. Available at http://www.goldfields.co.za/reports/annual_report_2007/pdfs/securing_the_future.pdf [Accessed 29 December 2011]; Gold Fields., 2011. Gold Fields Carbon Disclosure Report 2010. Available at http://www.goldfields.co.za/pdfs/carbon_footprint/reports/carbon_footprint_2010.pdf [Accessed 29 December 2011].
- 2 JSE., 2011. SRI Index. Available at <http://www.jse.co.za/sri/> [Accessed 13 October 2011]; Gold Fields., 2011. Media Releases - Gold Fields ranks first in JSE Carbon Disclosure Leadership Index and rated a Top. Available at http://www.goldfields.co.za/news_article.php?articleID=1140 [Accessed 01 February 2012].
- 3 JSE., 2010. JSE Magazine, July 2010. Available at http://www.goldfields.co.za/pdfs/carbon_footprint/in_the_media/jse_carbon_june_2010.pdf [Accessed 29 December 2011]; Gold Fields., 2011. Gold Fields' approach. Available at http://www.goldfields.co.za/sus_cs_approach.php [Accessed 29 December 2011].
- 4 Gold Fields., 2012. Media Releases - Gold Fields ranked 4th in the mining sector of the Dow Jones Sustainability Index [Online]. Available at http://www.goldfields.co.za/news_article.php?articleID=1167 [Accessed 01 February 2012].
- 5 Ibid.

- 6 Gold Fields., 2011. Gold Fields Sustainability Report 2010 – To be a global leader in sustainable gold mining. Available at http://www.goldfields.co.za/pdf/sustainability_reports/sustainability_report_2010.pdf [Accessed 29 December 2011].
- 7 Departments of Economic Development, Environmental Affairs, Science & Technology, Trade & Industry – South Africa., 2010. Summit Report (following the Green Economy Summit, 18–22 May 2010). Available at http://www.environment.gov.za/greeneconomy_summit/docs/summitreport.pdf [Accessed 29 December 2011].
- 8 Ibid.
- 9 Ibid.
- 10 Department of Mineral Resources, South Africa., 2010. Speech delivered at the Green Economy Summit 18-20 May 2010, Sandton Convention Centre, Johannesburg, South Africa on 18 March 2010: Ms Susan Shabangu, MP and Minister of Mineral Resources. Available at <http://www.sagreeneconomysummit.co.za/SPEECHBYSUSANSHABANGU,MINISTEROFMINERALRESOURCESATTHEGREENECONOMYSUMMIT.pdf> [Accessed 29 December 2011].
- 11 Ibid.
- 12 The Presidency of South Africa., 2010. Keynote address by His Excellency, Mr Jacob Zuma, President of the Republic of South Africa, at the Green Economy Summit, Sandton Convention Centre, Johannesburg. Available at <http://www.thepresidency.gov.za/pebble.asp?relid=295> [Accessed 29 December 2011].
- 13 Gold Fields., 2011. Op Cit.
- 14 Ibid.
- 15 Ibid.
- 16 Ibid.
- 17 Ibid.
- 18 Ibid.
- 19 Ibid.
- 20 Ibid.
- 21 Ibid.
- 22 Ibid.
- 23 Ibid.
- 24 Ibid.
- 25 Ibid.
- 26 Ibid.
- 27 Ibid.
- 28 Ibid.
- 29 Republic of South Africa., 2008. National Environmental Management Act, 107 of 1998. Cape Town: Government Printers.
- 30 Gold Fields., 2011. Op Cit.
- 31 Gold Fields., 2011. Carbon Policy. Available at http://www.goldfields.co.za/sus_cs_policy.php [Accessed 29 December 2011].
- 32 Gold Fields., 2011. Research Questionnaire completed by Prof. J.J.L. de Plessis, as part of the research undertaken for this paper.
- 33 Gold Fields., 2011. Presentation presented at COP17 side event (South African Department of Energy SA CCR Expo Energy side events), 7 December 2011.
- 34 Gold Fields., 2011. Research Questionnaire completed by Prof. J.J.L. de Plessis.

- 35 Gold Fields., 2011. Gold Fields Sustainability Report 2010 – To be a global leader in sustainable gold mining. Available at http://www.goldfields.co.za/pdf/sustainability_reports/sustainability_report_2010.pdf [Accessed 29 December 2011].
- 36 Carbon Disclosure Project (CDP)., 2011. CDP South Africa JSE 100 Report 2011. Available at <http://www.nbi.org.za/Pages/Publication-Details.aspx?NBIweb=e586ac5b-bcad-49be-ba41-81b0f1fa2ba3&NBllist=baaa9251-7130-4824-a0e9-0991a4bd678f&NBItem=144> [Accessed 05 February 2012].
- 37 Du Plessis, J.J.L. and Van Greuning, D.C., 2011. Destruction of underground methane at Beatrix Gold Mine. *Journal of the South African Institute of Mining and Metallurgy*, 111.
- 38 Ibid.
- 39 Ibid.
- 40 IPCC (Intergovernmental Panel on Climate Change)., 2007. Climate Change 2007 Synthesis Report (Fourth Assessment Report). Available at http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html [Accessed 11 February 2012].
- 41 Du Plessis, J.J.L. and Van Greuning, D.C., 2011. Op Cit.
- 42 Naidoo, B., 2011. Methane capture project at Beatrix mine registered under CDM. Mining Weekly. Available at <http://www.miningweekly.com/article/methane-capture-project-at-beatrix-mine-registered-under-cdm-2011-09-23> [Accessed 29 December 2011].
- 43 JSE., 2010. JSE Magazine, July 2010.
- 44 Gold Fields., 2011. Research Questionnaire completed by Prof J.J.L. de Plessis; Creamer, M., 2010a. Gold Fields turns methane into R200m revenue stream. Mining Weekly. Available at <http://www.miningweekly.com/article/gold-fields-turns-killer-gas-methane-curse-into-r200m-beatrix-revenue-stream-2010-05-26> [Accessed 29 December 2011]; Creamer, M., 2010b. Gold Fields to earn R200m for flaring Beatrix mine's deadly methane gas. Mining Weekly. Available at <http://www.miningweekly.com/article/gold-fields-to-earn-r200m-for-flaring-beatrix-mines-deadly-methane-gas-2010-05-28> [Accessed 29 December 2011]; 25 Degrees In Africa., 2011. Gold Fields to sell ZAR200-million of CERs in carbon trade deal. *25 Degrees in Africa magazine*, 6(1). Available at http://www.25degrees.net/index.php?option=com_zine&view=article&id=1183:gold-fields-to-sell-zar200-million-of-cers-in-carbon-trade-deal&Itemid=123 [Accessed 29 December 2011].
- 45 Du Plessis, J.J.L. and Van Greuning, D.C., 2011. Op Cit.
- 46 Energyrisk., 2010. Energy Risk Awards 2010. EnergyRisk magazine, June 2010. Available at http://www.goldfields.co.za/pdfs/carbon_footprint/in_the_media/energy_risk_award_062010.pdf [Accessed 29 December 2011].
- 47 Ibid.
- 48 Ibid.
- 49 Gold Fields., 2012. Kloof Hard Ice project. Available at http://www.goldfields.co.za/sus_cs_project_kloof.php [Accessed 01 February 2012].
- 50 National Business Initiative (NBI)., 2011. Energy Efficiency Case Studies, 2011. Available at http://www.nbi.org.za/Lists/Publications/Attachments/143/NBI_Energy_Efficiency_Case_Studies_Report_2011.pdf [Accessed 05 February 2011].
- 51 BBC., 2011. Australian parliament passes divisive carbon tax. Available at <http://www.bbc.co.uk/news/world-asia-pacific-15269033> [Accessed 29 December 2011].
- 52 National Business Initiative (NBI)., 2011. Agreement to agree at COP 17 represented real progress. Available at <http://www.nbi.org.za/Pages/Details.aspx?NBIweb=e586ac5b-bcad-49be-ba41-81b0f1fa2ba3&NBllist=64654bc6-d34d-4582-999b-0778898cb878&NBItem=93> [Accessed 11 February 2012].
- 53 National Business Initiative (NBI)., 2011. Agreement to agree at COP 17 represented real progress.

Natural gas conversion

Sasol's low carbon transition flagship for the petrochemicals industry

Shingirirai Savious Mutanga

ABSTRACT

This chapter unpacks initiatives by Sasol, a global player in the petrochemicals industry. The interests of the Sasol group of companies comprise diversified fuel, energy, chemical, and related manufacturing and marketing operations. Its principal feedstock is from coal, which the company converts into value-added hydrocarbons through the Fischer-Tropsch (FT) process technologies. While coal reserves present an opportunity for enhanced energy security, the coal to liquids (CTL) fuel process upon which Sasol's success has been built is a significant contributor to South Africa's green house gas (GHG) emissions. In response to the need to move towards lower carbon and greener operations, four distinctive Sasol initiatives are highlighted. These are: energy efficiency, low carbon electricity, the carbon capture and storage (CCS) initiative, and the natural gas conversion project. In 2008, Sasol established the New Energy Investment Company to drive these initiatives. Sasol's natural gas conversion project emerged as a major breakthrough in the transition to a low carbon and greener economy. Based on estimates provided, the conversion to natural gas contributed towards improved air quality. Sasolburg emissions of sulphur dioxide and nitrogen oxide decreased by 35 per cent while carbon dioxide emissions reduced by 47 per cent, that is almost 3,3 million tonnes per year. Apart from the four main initiatives, Sasol has other green economy initiatives that revolve around water resources management, as well as research and development.

INTRODUCTION

This chapter profiles Sasol's conversion from coal to natural gas as a flagship breakthrough towards a lower carbon and greener economy, both nationally and internationally. Sasol is a South African state owned enterprise with interest in energy. The natural

gas conversion project has inherent benefits of reduced emissions and grid pressure on electricity demand. At the time of finalising the writing of this chapter Sasol was embarking on a second wave of projects using natural gas to produce power in the towns of Secunda and Sasolburg. Apart from the natural gas conversion initiative, Sasol has other low carbon and green economy initiatives that include energy efficiency, water resources management, as well as research and development.

Since the industrial revolution, coal has been at the forefront of humankind's drive to improve the quality of life and support development. The petrochemicals industry has significantly benefited from coal, as a feedstock for manufacturing organic chemicals and synthetic fuels. Nonetheless, the implications arising from the extensive use of this fossil fuel has raised concerns about the quality of the environment at global, national and regional levels. Tighter environmental constraints have increased the pressure on producers and users of fossil fuels to clean up and reduce pollution. The effects of climate change have for years undoubtedly been an intractable element in the world's discourse on the environment. While pressure has been applied to drive responsible extraction, preparation, transport, and use of all fossil fuels, it is coal production and the combustion thereof that has attracted the most attention. Several companies in the petroleum industries like BP, Shell, Engen, and Total have adopted sustainable development as a key business driver to their operations. The approach to committing to the sustainability concept in their business strategy has differed widely.

Sasol is a technology driven, alternative fuels energy and chemicals company which was formed in 1950 in Sasolburg, South Africa. Sasol has grown to become South Africa's leading fuel provider and an international player in the energy and chemicals sectors. The company converts gas and coal into liquid fuels components and chemicals through proprietary processes.¹ The company mines coal in South Africa, extracts gas and condensate in Mozambique and oil in Gabon. Through Sasol's network of convenience centres, imported crude oil is refined and liquid fuels are retailed. In addition, it supplies gas to industrial customers within and outside South Africa. Sasol started producing synthetic fuels in 1955 and continues to pursue international opportunities to commercialise its gas-to-liquids (GTL) and CTL technology.² At the time of this writing, Sasol operated facilities in 38 countries, employing over 34 000³ people.

Sasol acknowledges that one of its significant challenges as an international energy company is balancing its current alternative energy security offerings with the desire to move towards a lower carbon future.⁴ Sasol's development ideology is driven by the needs of today's generation without compromising the ability of future generations, reflecting its commitment to sustainable development.⁵ The company's operations are conducted with sensitivity towards the economic, social and environmental needs of stakeholders.⁶ This has seen the development of an integrated sustainable development process which seeks to align its business performance in terms of the economic, social, and environmental issues that are material to its core strategy, and interest to stakeholders.

Sasol's absolute emissions of GHGs globally (measured in CO₂ equivalent), increased from 71,5 million metric tonnes (Mt) in 2009 to 75,0 Mt in 2010.⁷ This is mainly due to the inclusion for the first time of the Oryx GTL (a Qatar Petroleum/Sasol Joint Venture) emissions data.⁸ This figure includes direct emissions associated with Sasol's production processes as well as indirect emissions from imported electricity usage. Emissions intensity for 2010 (measured as carbon dioxide equivalent per ton of production) was 3,05. This compares with 3,24 in 2009 and 3,02 in 2008.⁹ The improvement in GHG intensity is primarily due to the inclusion of the Oryx GTL operation, which has lower carbon intensity. The Secunda gas turbine project, which started up in June 2010, will further improve emissions-intensity.¹⁰

PETROCHEMICALS INDUSTRY IN A GREEN GLOBAL ECONOMY

This section documents key concepts with regard to the petrochemicals industry in a low carbon and greener global economy. However, for one to fully comprehend issues, it is necessary to first discuss coal mining and energy consumption in South Africa as well as the conversion of coal to liquid hydrocarbon technology before deliberating on the petrochemicals sector in a low carbon economy.

COAL AND THE PETROCHEMICAL INDUSTRY

Coal has, since the industrial revolution, been at the forefront of humankind's drive to improve the quality of life and for supporting development.¹¹ The petrochemicals industry is based on feedstock derived from natural gas, oil or coal. During the period 1900 to 1930, essentially, the important stage of organic petrochemicals was made from coal and often referred to as 'coal chemicals'.¹² South Africa is the third largest hard coal exporting country after Australia and the United States of America, and the fourth largest hard coal producer, although its reserves of hard coal are only the fifth largest in the world.^{13,14}

The properties and quality of coal often determine the markets of the products. The majority of South Africa's coal is of medium rank bituminous and is mostly suitable for use as thermal or steam coals.¹⁵ While there are reserves of coking coal and anthracite in South Africa, these are small and in many instances nearing depletion. Research indicates that at current rates, based on estimated reserves, coal is expected to last around 140 years.¹⁶ As a consequence, production of coking coal and anthracite is small in relation to that of thermal coals. The predominant end uses of thermal coal both locally and abroad include the generation of electricity, a fuel in the final consumption sector producing steam or heat, feedstock in the petro-chemical industry, and use of small amounts in the metallurgical industry for pulverised coal injection (PCI) in blast furnaces or for blending with coking coal.

As an example, of the 243 million tons of coal produced in South Africa during the year 2006, 46 per cent was used in local generation of electricity while 18 per cent was used in the local production of synthetic fuels and chemicals; 28 per cent was exported, while 8 per cent contributed towards other activities such as industrial mining, and metallurgical and domestic use.¹⁷

Essentially, the coal mining industry is dominated by five companies, accounting for about 90 per cent of the saleable coal production. South Africa's eight largest mines¹⁸ account for 61 per cent of the output.¹⁹ Among these mines are Anglo Coal, BHP Billiton, Sasol Mining, Exxaro Resources, and Xstrata. Sasol was the second largest coal consumer during 1999 at 44,3 Mt, with Eskom, a national utilities company ranked first, at 91,3 Mt. Merchants was ranked third at a distant 5,4 Mt, followed by municipal power stations (1,7 Mt), mining (1,2 Mt), chemical industry (1,2 Mt), and other users 6,3 Mt. The statistics clearly confirm the dominance of two players in local coal consumption in the form of Sasol and Eskom. Sasol is also ranked among the top five companies in the coal industry in the country. South African coal for local electricity production is among the cheapest in the world.²⁰

However, the dynamics are changing; this is attributed to the increasing cost of generating electricity and escalating tariffs which are affecting most energy intensive industries. The beneficiation of coal, particularly for export, results in more than 65 million Mt of coal discards being produced annually.²¹

CONVERSION OF COAL TO LIQUIDS

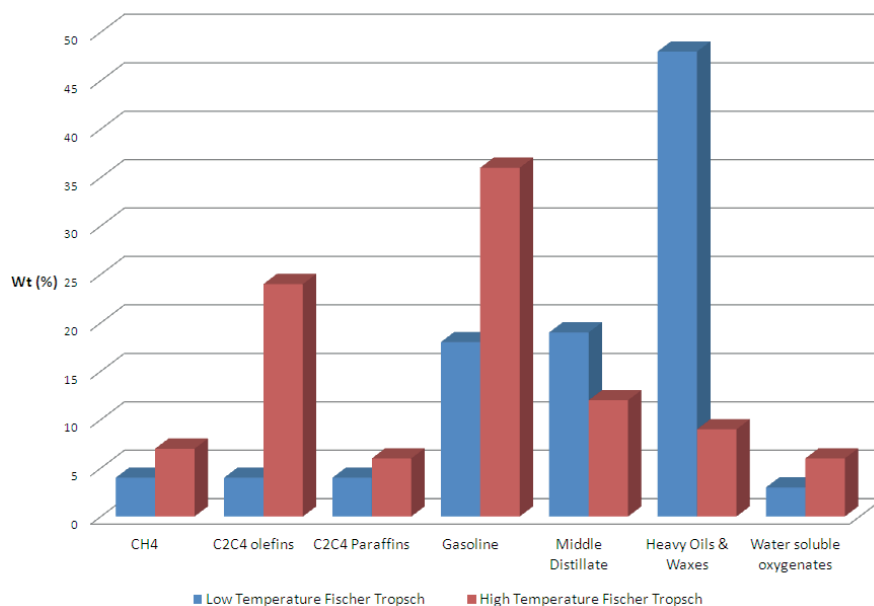
The process of converting coal into liquid hydrocarbon fuel using FT synthesis has proven itself on a large scale, with the production of chemicals being the dominant application for synthesis gas, followed by power generation.²² In simple terms, take coal, add some water, cook it, and you have got a liquid fuel suitable for the automobile industry. According to Princiotta, the conversion of coal to liquid fuels can take two main routes, namely: the indirect and the direct conversion approach. The 'indirect route' involves the breaking down of the coal to form low molecular weight gases which can then be catalytically converted to synthetic liquid fuels.²³ The 'direct route' converts coal to liquid hydrocarbon products without first going through low molecular weight gases as a primary intermediate.²⁴

The indirect route comprises two main steps, gasification and the conversion of synthesis gas to liquid hydrocarbon products. *Gasification* involves the production of synthesis gas. During the gasification process sufficient carbon is burned using oxygen to increase the temperature to above 1200-1400°C.²⁵ At this temperature the char remaining reacts with water (steam) to produce an equilibrium mix of CO (55 per cent), H₂ (34 per cent) and Carbon Dioxide (CO₂) (10 per cent) referred to as synthesis gas (syngas). This is followed by a water gas shift reaction.²⁶ The CO₂ is removed leaving CO and H₂

rich synthesis gas which is catalytically converted to a range of synthetic hydrocarbon products via the FT process.

Liquid fuels synthesis from coal involved the introduction of the FT technology during the 1920s in Germany, resulting in several commercial plants being erected to produce fuel. The Nazis used the process to provide up to half of their transportation fuel needs during the Second World War.²⁷ The technology was commercialised by Sasol in South Africa in the 1950s and expanded in the early 1980s to a larger facility able to produce 160 000 bpd of transportation fuels and chemicals.²⁸ From the FT technology, which utilised iron based catalysts, a broad range of products including methane, paraffin, gasoline, oils, and molecular waxes were produced (Figure 6.1).

Figure 6.1 Products from the Fischer-Tropsch catalysts operating at varying temperatures



Source: Author²⁹

The primary FT Synthesis reaction can be illustrated by the equation $(2n+1) H_2 + nCO = C_nH_{(2n+2)} + nH_2O$. The hydrogen distribution follows an Anderson–Schultz–Flory distribution given by: $W_n/n = (1 - p)^{n-1}$. Where: W_n is the weight fraction of hydrocarbon with carbons, p is the chain-growth probability. The FT Synthesis requires a large amount of refining to produce finished transportation fuels. Princiotta explained the role of catalysts based on cobalt which requires refining to produce final transportation fuels.³⁰ This includes processes from coal exploration, to gasification, through gas purification and first generation of co-products which are passed through advanced synfuel reactors to production refinery, leading to fuels. There are ongoing debates in terms of the coal to liquids technology. The case for and against CTL is presented in Table 6.1

Table 6.1 The case for and against coal to liquids

CTL Advantages	CTL Disadvantages
• CTL offers the opportunity to reduce petroleum imports and aids in diversifying transportation fuel supply. • As the price of oil increases relative to that of coal, synthetic liquids produced from coal certainly cut the costs. Ben Glasser noted that the new process could cut the energy cost of producing the fuel by 20%.³¹ • Coal is cheap in South Africa hence it can enhance socio-economic development much faster.	• Conversion of CTL is capital and energy intensive, hence it requires large inputs which in turn results in additional production of CO₂. • This has a huge negative impact on GHG emissions, hence requires substantial investment in Carbon capture and storage. • Coal-derived fuel could produce twice as much CO₂ as traditional petroleum fuels on a lifecycle basis and at best will emit at least as much greenhouse gas.³²

Source: Author³³

In the past, gasification was viewed by many as a ‘dirty’ technology with great adverse environmental impacts associated with the technology. Over the past decade this view has slowly been changing, since gasification technology has demonstrated its versatility, and has improved efficiency in many areas. The technology is best suited for treating wastes and by-products from other processes as well as natural or renewable feed stocks like bio-mass, agriculture, and municipal waste. Synthesis gas production through gasification is growing at a rate of approximately 10 per cent per annum, indicating that gasification is a thriving technology.³⁴

THE PETROCHEMICALS INDUSTRY AND A LOW CARBON FUTURE

Concerns over the quality of the environment at global, national and regional levels, and tighter environmental constraints, are placing increasing pressure on the producers and users of fossil fuels to reduce pollution.³⁵ While pressure has been applied to the extraction, preparation, transportation and use of all fossil fuels, it is coal production and the combustion thereof that has attracted the most attention.³⁶

Research has shown that the burning of fossil fuels emits a wide range of pollutants, some of which affect human health³⁷ and come with a significant CO₂ footprint.^{38,39} This subsequently affects the carbon cycle by offsetting the balance between the rate at which sources add the gases into the atmosphere and the sinks (removal of the CO₂). The GHG emissions arising from coal use is a cause for concern as a significant contributor to the intractable element of climate change. The United Nations Framework Convention on Climate Change (UNFCCC) of 1992, which came into force in 1994 followed by the Berlin Mandate and subsequently the Kyoto Protocol of 1997 (ratified in 2005), brought legally binding commitments to the 37 industrialised countries (called Annex 1) to reduce their GHG emissions. On the other hand, there was recognition that the Group of 77 (G77) developing countries are low emitters and need an opportunity to develop sustainably.

It is through these binding agreements that one of the key elements emerging was the establishment of the Clean Development Mechanism (CDM) under the Kyoto Protocol, which has allowed Annex 1 countries to benefit from the installation of certified emission reducing projects.

Pressure on producers and users of coal have necessitated the development of clean coal technologies (CCTs), through which coal must be produced, processed and transported in an environmentally friendly manner. Impacts of coal mining on the environment have been increasingly diminished by legislative requirements through informed management and through the application of new technologies. Table 6.2 summarises some of the technologies and instruments used to achieve this.

Table 6.2 Technologies and tools for a friendly environment

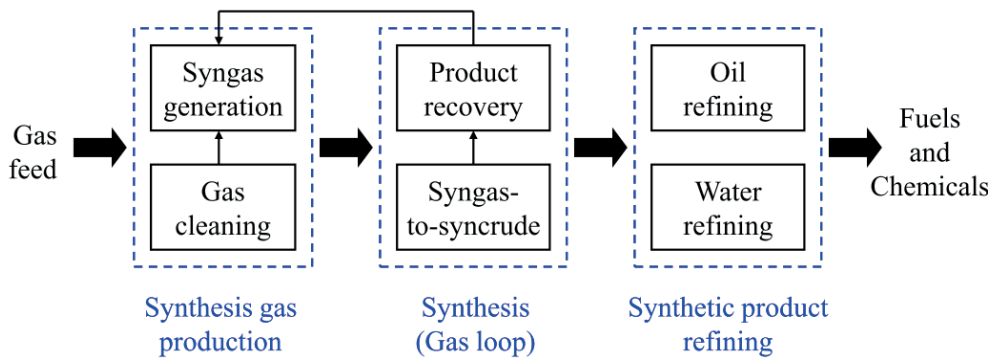
Instrument	Benefit
- Advanced dust suppression in operations - Cladding of burning discard dumps - Development of co-disposal of fine and coarse rejects - Use of the Environmental Management Programme to monitor day to day mining operations - Implementation of ISO 14 000 Environmental Management Systems (EMS) - Rehabilitation of open cast mines - Introduction of advanced Water Resources Management Technologies	- Reduced atmospheric pollution - Reduced health risks - Reduced erosion - Reduced pollution of water
- Use of CCTs are those technologies which reduce particulates acidic and carbon dioxide - The control of particulate emissions using baghouses, cyclones, and electrostatic precipitators - Bolt-on equipment to abate Sulphur & Nitrous Oxide - Pulverized fuel combustion - Fuel gas Desulphurisation (FGD) techniques applied to emissions after the removal of particulates by means of baghouses or electrostatic precipitators - Use low sulphur coal - Low NOx burners - Fluidized bed combustion (FBC) and coal gasification and liquefaction.	- Remove pollutants in pre-and post-combustion scenarios - More efficient removal of pollutants such as sulphur dioxide. Successfully remove up to 95% of the reduced SOx - Greater energy conversion efficiencies resulting in reduced carbon dioxide emissions per unit of energy (Figure 6.5) - Heat produced from combustion is used to drive the electrical generator while the hot exhaust gases are passed through the heat recovery steam generator to raise steam to drive a steam turbine. Energy conversion efficiency 35-60%⁴⁰
Carbon capture and storage (CCS)	- In order to reduce CO₂ emissions a wide-scale capability to capture carbon dioxide from industrial plants and store it deep underground is imperative - Rapid deployment of CCS by 2020 could account for 19% of the total CO₂ reductions needed by 2050, according to the International Energy Agency.⁴¹

Source: Author⁴²

In 1985, Exxon Mobil developed a gas to methanol to gasoline commercial plant in New Zealand. This was followed by Shell's first large-scale (greater than 10,000 bpd) GTL plant in Malaysia in 1993.⁴³ No new full-scale GTL plant was commissioned during the period 1994 to 2005, with the exception of PetroSA's Mossas project which started production in 1997. However, a number of pilot projects and units were built within existing oil refineries, particularly in gas-rich countries such as Qatar.⁴⁴ Some of the most commonly identified end products GTL projects are diesel, lubricant base stocks, and petrochemicals.

With regard to natural gas conversion technology, industrial GTL facilities are often classified according to syngas conversion technology that is being employed either as methanol synthesis or FT synthesis. The FT was discussed earlier in the chapter. The schematic representation of GTL is shown in Figure 6.2.

Figure 6.2 Schematic overview of GTL fuels representation



Source: Arnold de Klerk⁴⁵

A question then arises: Why GTL? Some key factors that have been promoting further development of GTL projects include: sustained high crude prices, controllable capital expenses, and the motivations of natural gas resource-rich governments such as Qatar and Nigeria.⁴⁶ In addition, crude oil is a finite resource which, with time, demand shall exceed its supply. Hence, GTL technology enables the production of similar products as are presently produced from crude oil. The case for and against GTL technology is presented in Table 6.3.

Table 6.3 The case for and against gas to liquids

The Case for GTL																			
Environmental Perspective																			
- Natural gas is one of the most hydrogen-rich carbon sources available on earth with an estimated 3,000 tcf of the world's gas reserves of 6,100 tcf.⁴⁷ Therefore, many in the industry consider GTL as the 'holy grail' of gas technology. - While crude oil supply is constrained, indirect liquefaction is on a more C-efficient route for alternative C-based products.⁴⁸ $2\text{CH}_4 + \text{O}_2$$4\text{C} + 4\text{H}_2\text{O} + \text{O}_2$ $4\text{H}_2 + 2\text{CO}$$4\text{H}_2 + 2\text{CO} + 2\text{CO}_2$ The effective feed H: C determines the CO₂ footprint. - Produce clean burning fuels to reduce environmental impacts. This can be blended to improve the quality of conventional fuels without any or limited loss in fuel economy or engine performance.																			
Economic Perspective																			
- This is envisaged when there is a meaningful price difference between Natural Gas and Crude Oil. The effective cost, efficiency, and feed cost variations are illustrated on the table below.^{49, 50} - Generate high-quality lubricant base stocks required for modern engines. <table><tr><th>Feed Material</th><th>Feed Cost \$/bbl equiv</th><th>Efficiency \$/GJ</th><th colspan="2">Effective Cost (per cent) \$/bbl equiv</th></tr><tr><td>Natural Gas</td><td>28</td><td>5</td><td>75</td><td>37</td></tr><tr><td>Crude Oil</td><td>100</td><td>18</td><td>89</td><td>113</td></tr></table> - Economically produce food-grade waxes.					Feed Material	Feed Cost \$/bbl equiv	Efficiency \$/GJ	Effective Cost (per cent) \$/bbl equiv		Natural Gas	28	5	75	37	Crude Oil	100	18	89	113
Feed Material	Feed Cost \$/bbl equiv	Efficiency \$/GJ	Effective Cost (per cent) \$/bbl equiv																
Natural Gas	28	5	75	37															
Crude Oil	100	18	89	113															
The Case Against GTL																			
- High capital cost for alternative carbon feed to liquids (XTL). - Investment risks are both financial and technical. - The 'Hiatus effect' where no track record of proactive and sustained initiative has been envisaged in the US.⁵¹ - Technical risk is high, particularly at the starting phase. The company with most production experience in XTL reported serious technical difficulties during and after commissioning of Oryx GTL.⁵² - Technical complexity associated with GTL synthetic crude oil production plants compared to conventional oil refineries. Huge capital investments are required for synthetic plants.																			

Source: Author⁵³

Most of the companies in the petroleum industries have adopted sustainable development as key to their operations. They, however, differ in terms of their approaches in committing to sustainability concepts being introduced into their business strategy. Apart from Sasol, a quick scan of its business competitors such as Engen, Shell, Total, and Petrol South Africa, indicates that they all have similar low carbon initiatives (Table 6.4). Engen's sustainability initiatives revolve around recycling oil, refinery processes, and adherence to International Standardization Organisation (ISO) 9001 and 14001⁵⁴ management systems. Other companies in the industry have tended to adopt the same initiatives.

Table 6.4 Low carbon initiatives in South Africa

Low Carbon Initiatives	Companies in the Petrochemicals Industry in South Africa			
	ENGEN	SHELL	TOTAL	PETRO SA
Energy Efficiency	✓	✓	✓	✓
Low carbon electricity	✓	✓	✓	✓
Renewable energy	✓	✓(Bio-fuels)	No data	✓
Natural Gas	✓	✓(Bio-fuels)	No data	✓
Carbon Capture and Storage	✓	✓	No data	✓
Recycling Oil	✓	✓	✓	✓
Refinery Processes	✓	✓	No data	✓
ISO Standards Cleaner Fuels	✓	✓	✓	✓

Source: Author⁵⁵

Oil recycling has been voluntarily introduced, like the establishment of the Recycling Oil Serves the Environment (ROSE) foundation which promotes environmentally acceptable collection, storage, and recycling of used oil.⁵⁶ Most of the players in the petrochemicals industry are subscribed to ROSE. Since 1994, under the chairmanship of Engen, ROSE has, among others, facilitated the founding of the National Oil Recycling Association of South Africa (NORA-SA), representing all significant collectors and recyclers of used oil.⁵⁷ While pre-2007, the activities of a single collector were being funded, the new model incentivises the entire value chain. One of the major successes of ROSE has been that it has influenced the collection of almost one billion litres of used oil.⁵⁸ Statistics have also shown that members of NORA-SA collected about 65 million litres of used lubricating oil in 2008.⁵⁹ Another achievement of the foundation has been their considerable influence in reducing soil and water pollution through inconsiderate dumping, and reducing air pollution through indiscriminate burning.

The petrochemical industry is bound by various pieces of legislation (e.g. National Environmental Management Act (NEMA) and supporting Air Quality Act and Waste Act, as well as the National Water Act; etc) to regulate the management of environmental impacts. To give focus to the quality of their products and their environmental initiatives, companies have implemented ISO 9001 for Quality Management System and ISO 14001 for Environment Management System at a number of key operational sites. As an example,

Engen has ISO 19001 certified sites in Cape Town and Johannesburg, distribution centres dealing with Solvents, Lube Oil Blend Plant, Refinery Durban, Zenex Blend Plant, Safor Durban, Durban Chemicals, Richards Bay Terminal, and Wentworth Depot. Engen's ISO 14001 certified sites include: Lube Oil Blend Plant, Refinery Durban, and Safor Durban.⁶⁰

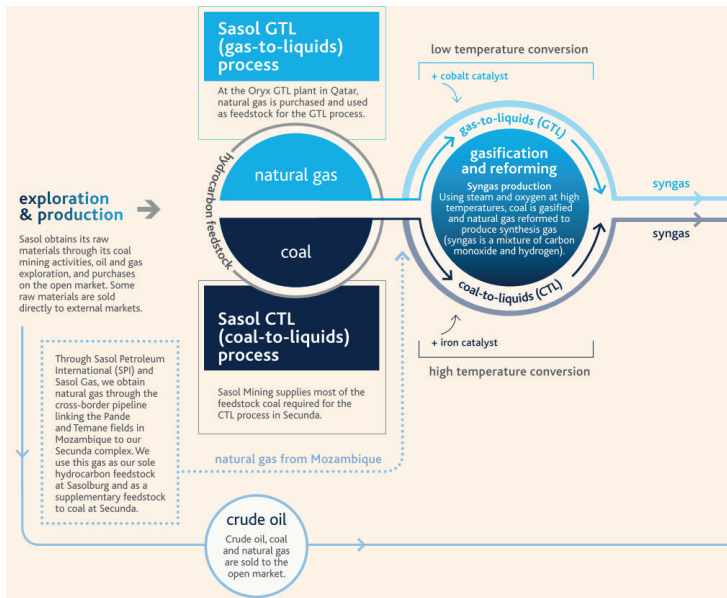
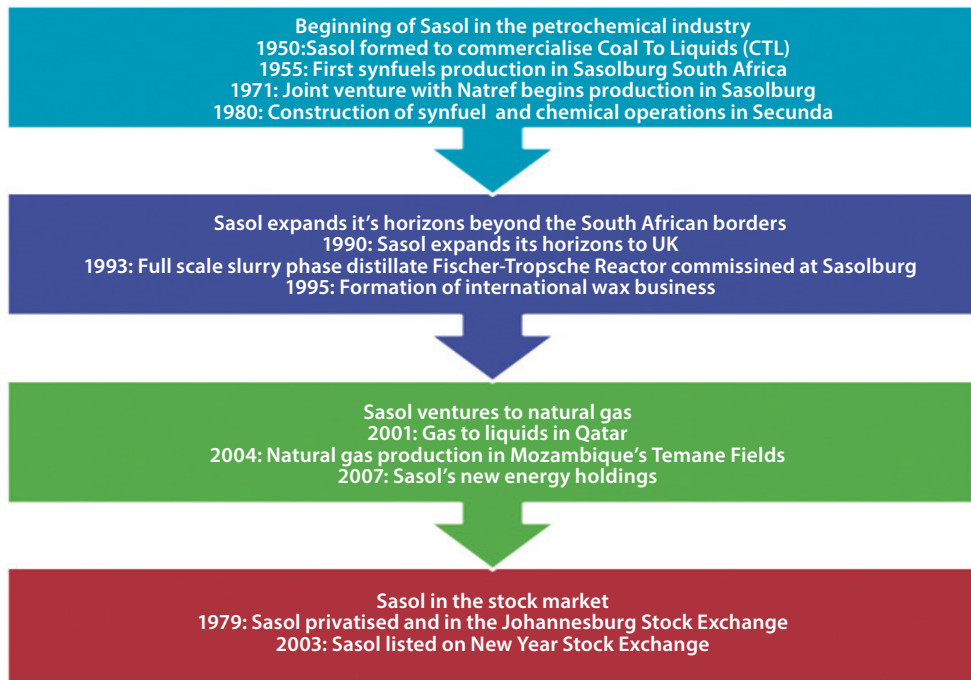
Some of the companies, such as Shell, promote research and develop on technologies that increase efficiency and reduce emissions from its operations. A striking example has been the research on handling energy demand. This has seen Shell help manage energy demand by growing the market for products and services, like fuel economy formulations for its petrol and high efficiency lubricants that help millions of retail and business customers use less energy and emit less CO₂.⁶¹ It is through research and development that policy analysis has actively encouraged governments to provide an effective international policy framework for managing CO₂ and other GHGs.

Several companies have embarked on aggressive development of low carbon sources of energy, witnessing a rising trend in the supply of natural gas and development of bio-fuels for transport purposes. The introduction of cleaner fuels supports the introduction of more carbon efficient engine technology confirming some companies' environmentally friendly initiatives in the petroleum industry. Engen has made a commitment to contribute to a lead-free petrol environment while reducing sulphur in both diesel and petrol. As South Africa's second-biggest refinery, Enref, based in Durban, strives to keep its domestic and international (Lesotho, Botswana and Swaziland, and half of our Namibian markets) 'wet'. Enref's current five-year strategic plan, which runs until 2013, has a clear focus on the environment.⁶²

SASOL'S BUSINESS CASE FOR A LOW CARBON COMPANY

As highlighted earlier, the Sasol group comprises diversified fuel, energy, chemical, and related manufacturing and marketing operations. This is complemented by interests in research and technology development and upstream oil and gas exploration as well as production. Figure 6.3 illustrates the company's key operational clusters.

Sasol has grown from strength to strength and is a major international player in the petrochemicals industry. Its continued expansion has seen it making strides in a GTL initiative in Uzbekistan, while advancing its upstream oil and gas activities in West and Southern Africa, the Asia Pacific Region, and Canada.⁶⁴ To date the company is listed on the Johannesburg Stock Exchange (JSE) Limited in South Africa and on the New York Stock Exchange in the United States (US).⁶⁵ Figure 6.4 illustrates the company's historical milestones since its formation in 1950. One key silent element in its historical milestones is the company's recognition that creating value in sustainable development initiatives is the tonic required to move towards a low carbon future.

Figure 6.3 Sasol's integrated business modelSource: Author⁶³**Figure 6.4** Sasol's historical milestones

Source: Author

Traditionally, most companies have viewed sustainable development challenges from a compliance and risk management dimension. A point of reference is the recent oil spill in the Gulf of Mexico, which has shown that these elements are important. Failures to comply and address such challenges have a profound impact on a company's long term value and reputation.⁶⁶ Likewise, Sasol has embraced the notion of value creation in its sustainable development path. Today's societal and environmental challenges present some exciting opportunities to businesses. In the same vein, Sasol's investment in the New Energy business unit reflects the belief that there are valuable commercial gains from moving to low carbon business opportunities.⁶⁷ Therefore, managing sustainable development challenges is integral to the achievement of Sasol's strategic business objectives.

Sasol's principal feedstock is obtained from coal, which the company converts into value-added hydrocarbons through FT process technologies.⁶⁸ While coal reserves present an opportunity for enhanced energy security, the CTL fuel process upon which Sasol's success has been built is a significant contributor to GHG emissions. This has prompted Sasol to make a commitment towards technology innovation and commercialisation, a process which has resulted in improved energy efficiency and the promotion of alternative energy sources. In its operational structures, Sasol established the GHG Management Committee to provide a focused response to climate challenge.

ENABLERS FOR TRANSITION TO A GREEN ECONOMY AT SASOL

Three distinctive initiatives can be highlighted as the enablers for Sasol's transition to a lower carbon and greener company. These revolve around energy efficiency; renewable energy, low carbon electricity, and carbon capture and storage. In its endeavour to provide a focused response to the carbon challenge, Sasol established the GHG Management Committee which governs strategic GHG related issues and takes decisions on behalf of the group. The GHG Management Committee was supported by a Carbon Credit Management Committee which functions as a sub-committee of the GHG Management Committee. The Carbon Credit Management Committee also governs the group's carbon portfolio. Sasol New Energy is an investment company whose role is not only to host renewable energy but also drive the implementation of energy efficiency initiatives.

In addition, a Climate Change Task Team was constituted by the Sasol Group Executive Committee to assess, evaluate, and make recommendations on pressing matters related to climate change.⁶⁹ This task team is now operating under project Everest that focuses on new developments in the green economy space. Sasol is committed to working with its key stakeholders such as government departments and regulatory authorities in the countries where it operates in order to achieve optimum GHG management solutions. They engage both through business and trade associations like Business Unity South Africa, the National Business Initiative, the Business Leadership South Africa, and directly as Sasol. They believe that business is part of the solution to the climate change challenge,

and that only through working in partnership with national and international stakeholders in developing climate change related policies both in South Africa and globally can the required impetus and solutions be achieved. Sasol appreciate the need for collective efforts across sectors and stakeholder groups in addressing the water challenge. The group has been very active in various collaborative engagements. During the year 2009, in addition to the usual annual reporting on Sasol's water footprint and risks, the group also participated voluntarily in the Water Disclosure initiative of the Carbon Disclosure Project (CDP).

The group committed to reduce its carbon emissions through developing more efficient production processes and exploring CCS solutions. The company set several targets to reduce its GHG emissions intensity by 15 per cent (on the 2005 baseline) in all its operations by 2020, and to reduce its absolute GHG emissions by 20 per cent for all new CTL plants commissioned before 2020, and by 30 per cent for plants commissioned before 2030 (with the average 2005 CTL design as the baseline).⁷⁰ Sasol spent R100 million (about US\$11,1 million) in 2009 on energy efficiency related projects, which should achieve a reduction of around 760 000 tonnes of GHG emissions a year.⁷¹

Sasol New Energy (SNE) was created to focus on developing options and new technologies for its operations to utilise in a carbon and water-constrained world. To reduce the production of CO₂ in its operations and integrate new technologies into its processes, SNE is exploring renewable and lower-carbon energy options such as solar and wind power, as well as hydro-electric, clean coal, and natural gas-based power opportunities. CCS is being investigated to sequester CO₂ produced in the FT process. Sasol has set a target for improving the energy efficiency of its South African utility facilities by 15 per cent per unit of production by 2015, compared with a baseline set in 2000.⁷² Sasol is a co-founder of the South African Centre for Carbon Capture and Storage and acquired a share in Norway's Technology Centre Mongstad, which has been established to test, verify, and demonstrate technology suitable for deployment at large-scale carbon capture facilities.⁷³ The concept of carbon capture and storage is being investigated for application around Sasol's existing and potential future facilities.

SNE also took responsibility for the group's sustainable water strategy, based on the commitments made by the group in March 2008 under the United Nations Global Compact CEO Water Mandate.⁷⁴ Ensuring access to a reliable supply of water, and minimising Sasol's impact on water resources, is a critical strategic priority for Sasol. There are various site-specific challenges relating to the supply, quality, and reliability of water resources in regions in which the group operates or plan to operate.⁷⁵

Water management has been identified as a material issue in Sasol's governance matrix, and hence a dedicated sustainable water function was established within SNE to respond to these challenges. As an example, Sasol's total water demand for 2010 was 151,3 million cubic meters (Mm³). This compares with an annual water demand of 152 Mm³ in 2009 and 154 Mm³ in 2008. The total volume of water recycled for the 2010 financial year was 139,3 Mm³, compared with 130.5 Mm³ in 2009.⁷⁶ In addition to managing water use

inside the factory fence, the group recognises the importance of playing a meaningful role in supporting water resource management in the broader catchments within which the group operates.⁷⁷ Approximately 80 per cent of the group's total water requirement comes from the Vaal River system in South Africa, where demand represents about 4 per cent of the total off-take from this system. Following a water supply shortfall that was identified in this area in 2004, Sasol has invested in a 40 per cent share of the R2,7 billion Vaal River Eastern Sub-system (VRESAP) pipeline project, which, was commissioned to provide a reliable supply of water from the Vaal Dam to Sasol's Secunda operation, and for use by Eskom for electricity utility.

NATURAL GAS CONVERSION: SASOL'S LOW CARBON BREAKTHROUGH

There is no doubt that Sasol's ongoing move from coal to natural gas can be hailed as a major breakthrough in the transition to a lower carbon company. The switch from coal to natural gas based operations enables Sasol to generate cleaner power, become more energy efficient and reduce its carbon emissions. Since 1999, the group has invested over US\$1,2 billion in a natural gas conversion project aimed at delivering natural gas through pipelines from Temane fields in Mozambique to its operations in Secunda and Sasolburg in South Africa.⁷⁸ The inception of the Mozambique to South Africa Natural Gas Project or Sasol Natural Gas Project (SNGP) follows the signing and implementation of a series of landmark agreements and undertakings between the governments of Mozambique and South Africa. This project became a development defining moment for South Africa, Mozambique, and the Southern African Development Community (SADC) as it became a major new catalyst for stimulating further socio-economic development in the region.

In Mozambique, the natural gas project included developing an essential processing facility at Temane and the construction of an 865km cross-border pipeline between Mozambique and South Africa. In South Africa, the project encapsulated the construction of Sasol industrial and domestic gas distribution network.⁷⁹ In 2010, Sasol commissioned two gas turbines at Sasol Synfuels' operations in Secunda to produce electricity from natural gas from Mozambique. Sasol's major operating facilities in both Sasolburg and Secunda utilise gas as its hydrocarbon feedstock and as a supplementary feedstock, respectively.⁸⁰

Using natural gas as a feedstock for power production rather than coal has some benefits. For example, this more than halves the CO₂ emissions. Sasol is in a position to use gas to generate 420 MW, replacing more than 25 per cent of the coal-based electricity it has been consuming, and resulting in a significant carbon dioxide reduction. The company also supplies natural gas to 550 industrial and commercial customers through a 1 200km pipeline network in South Africa.

Initially, the turbines in Secunda were operating in open-cycle mode, producing 200 MW of power which is being sold to the state utility Eskom. These turbines were

converted to closed-cycle mode with the addition of heat-recovery steam generators, increasing electricity generation to 280 MW. The overall reduction in CO₂ emissions is in excess of 1,2 million tons per annum.⁸¹

Sasol's natural gas conversion project has contributed to security of supply during the extremely tight supply/demand situation experienced for electricity. In essence, the initiative has reduced the grid pressure. Based on estimates from the Environmental Impact Assessment (EIA) report, the conversion to natural gas contributes towards improved air quality. Sasolburg emissions of sulphur dioxide and nitrogen oxide are likely to decrease by 35 per cent while carbon dioxide emissions could be reduced by 47 per cent, almost 3,3 million tons per year.⁸² One major concern for Sasol and the local communities at Sasolburg have been the odorous hydrogen sulphide emission, and the company embarked on its elimination. The Sasolburg plant reduced its water consumption by between 27 per cent and 30 per cent after decommissioning the water intensive gasification processes.⁸³ In addition, the closure of gasification and other plants resulted in a 50% reduction in solid waste.⁸⁴

Table 6.5 Sasol Group emission trends⁸⁵

Financial Year	2004	2005	2006	2007	2008	2009	2010	2011
Production performance								
Total production (kilotons)	25 810	21 859	22 837	22 114	24 218	22 038	24 548	25 228
Greenhouse gases (kilotons)								
Direct methane (CH ₄)	233	313	357	394	354	339	371	402
Direct nitrous oxide (N ₂ O)	-	1	1,52	2	0,7	0,6	0,3	0.2
Direct carbon dioxide (CO ₂)	66 838	58 754	58 604	57 345	58 722	54 465	56 265	56 966
Indirect carbon dioxide (CO ₂)	9 565	8 100	8 890	8 901	9 718	9 739	10 814	9 308
Total greenhouse gas (CO₂ equivalent)	81 593	73 760	75 454	75 094	76 104	71 507	74 981	74 977
Emission intensity (CO₂ equiv/ton product)	3,16	3,37	3,3	3,4	3,14	3,24	3,05	2,99

As indicated in table 6.5, for the period between 2004 and 2011, there hasn't been a significant shift in total production trends, yet the total greenhouse (CO₂) equivalent has declined from 81 593 kilotons to 74 977 kilotons. The decline is particularly pronounced on direct CO₂ emissions, an anticipated development following the conversion to natural gas and other low carbon initiatives within the Sasol group of companies. The emission intensity has also dropped from 3,16 to 2,99 (CO₂ equivalent/ton product).

OTHER LOW CARBON INITIATIVES

A number of other low carbon and green economy initiatives are evident at Sasol. These include energy efficiency, producing a new-generation diesel, water resources management technology, as well as significant investment in research and development.

Following the South African government's energy efficiency strategy, targeting 12 per cent reduction in national demand, Sasol has committed itself to improving its efficiency on South African utilities by 15 per cent per unit of production by 2015 using the 2000 baseline, under the voluntary energy efficiency accord.⁸⁵ The fuel switching from coal to gas has been a major drive to improve its energy efficiency.

Sasol GTL diesel is far superior in quality to crude oil derived diesel. Essentially, it has a high cetane number (70+ versus the conventional 45–55), low sulphur (less than five parts/million), low aromatics (less than 1 per cent) and excellent cold-flow characteristics.⁸⁶ The low-emission, premium-grade fuel is also idyllic as a blend stock for upgrading conventional diesels.

GTL diesel has proven that it is compatible with all fuel distribution infrastructures as well as engine and exhaust after-treatment technologies. It can be used in blends with crude oil-derived diesel in any compression ignition engine. The performance benefits of GTL diesel include improved cold-start properties, reduced noise, and cleaner combustion, hence low emissions.⁸⁷

Besides the research and development and new-product formulation and testing work done at Sasolburg, through Sasol Technology's fuel research group, further fundamental research at the Sasol Advanced Fuels Laboratory (SAFL) is conducted in collaboration with the University of Cape Town, and the Sasol Fuels Application Centre (SFAC). SFAC enables the group to conduct sea-level engine and fuel research and tests in line with international trends.⁸⁸

Focused research and development during the 1980s and 1990s led to the development of the low-temperature Sasol Slurry Phase Distillate process used at Sasolburg, and the high temperature Sasol Advanced Synthol process used at Secunda. The success of these technologies is evident in their continued application in the Sasol Wax capacity expansion in Sasolburg, as well as in the provision of the 10th SAS reactor for Secunda.⁸⁹ The development of the US shale gas industry in recent years is providing exciting opportunities for the application of Sasol's proprietary Slurry Phase Distillate GTL technology. The success of the group's investments in the Oryx GTL joint venture in Qatar, Escravos in Nigeria and Uzbekistan are an epitome of more efficient GTL operations. Through its extensive research and development programme, various processes for recovering and purifying solvents, waxes and phenolics for the world market, as well as 1-pentene, 1-hexene, 1-octene, and higher alpha olefins have been developed.

Sasol Mining has also developed, or co-developed, high-extraction mining methods, advanced directional drilling techniques, roof-bolting systems, continuous-miner systems, and a virtual-reality training system for continuous-miner operators, among

other performance enhancing innovations. The group has committed to investing an amount of about R250 million (US\$33 million) over a 10-year period to build research capacity at South African tertiary institutions.⁹⁰ Such collaborations in South Africa are complemented with selected international research programmes, which include work undertaken at Sasol's facilities at the University of St Andrews in the United Kingdom and in The Netherlands. The group has done pioneering research in the use of synthetic fuels and was the first company to develop and get approval for synthetic jet fuel.⁹¹

FUTURE PERSPECTIVES IN GREEN ECONOMY INITIATIVES AT SASOL

There are two planned initiatives to address the lower carbon and greener economy at Sasol. These initiatives include: the exploration of renewable energy and bringing GTL diesel to the world. Sasol has been evaluating options for producing electricity from renewable sources; including biomass, and investing in the development of thin-film photovoltaic technology that uses solar power. The later is believed to be a viable option for South Africa, a country blessed with abundant direct sunshine.

SNE commenced the implementation of an R1,8 million investment in a 140 MW gas-fired power plant at Sasolburg, as well as two gas-fired power plant opportunities in Mozambique.⁹² The Sasolburg gas engines are expected to be operational by early 2013 producing 50 per cent less GHG compared to coal of equivalent capacity.⁹³ This is projected to enable CO₂ reductions in the region of 1 million tonnes per annum.⁹⁴

The year 2007 witnessed the beginning of operations at Oryx GTL, a joint venture with Qatar Petroleum. Currently, it is one of the world's prime commercial-scale GTL facilities, with an exceptional performance, at times in excess of 35 000 b/d being produced.⁹⁵ With its superior properties, Oryx GTL diesel has been marketed mostly as a blend stock in Europe and Asia. The recent technology developments in the extraction of shale gas have provided cost-effective opportunities for GTL. Sasol is embarking on a joint feasibility study with Talisman to look at the potential for a GTL facility in Canada, following agreements with Talisman to acquire a 50 per cent stake in their Farrell Creek and Cypress facilities. Other targeted country projects include the joint collaboration with Chevron and the Nigerian National Petroleum Corporation to develop the Escravos GTL plant in Nigeria. In addition, a GTL plant with an estimated capacity of 1,5 million tons of GTL product a year has been proposed in Uzbekistan, in partnership with Petronas and Uzbekneftegaz. Sasol's FT technology is believed to support some of the leading car manufacturers investigating the potential of using more efficient homogenous charge compression ignition in their new-generation engines.

KEY CHALLENGES

Reducing GHG emissions, while repositioning the Sasol group for a carbon constrained future, is a key challenge to business operations. While some progress in reducing GHG emissions is expected from energy efficiency projects and introducing lower carbon electricity, major reductions in GHG emissions will only be possible if either large scale CCS becomes feasible or a large and economically feasible source of gas can be secured.

Apart from limited access to readily available gas, water scarcity remains a key challenge. Sasol's operations are water intensive and reducing water consumption and adopting a catchment view regarding water supply and impacts, in line with their Commitments to the United Nations Global Compact CEO Water Mandate, is no easy task.

Sasol's several subsidiaries, joint ventures and associates operate in countries and regions that are subject to significantly differing political, social, and economic and market conditions. This increases the business risk of Sasol Synfuels/or Petroluem International⁹⁶ which has significantly invested in operations in Africa, Europe, North America, Asia, and Middle East countries. Government policies, laws, and regulations in these countries may change in the future.

There is also a risk that the group's plants that were constructed during buoyant market conditions will have to operate in markets in which product prices may have declined, as the world is currently experiencing. The impact of such changes on Sasol's ability to deliver on planned low carbon initiative projects cannot be ascertained with any degree of certainty.⁹⁷

CONCLUSION

Concerns over the quality of the environment at global, national, and regional levels and tighter environmental constraints are increasingly pressurising the producers and users of fossil fuels in the petrochemical industry to address their pollution risks. Sasol's business case and initiative towards a lower carbon future is underpinned by creating value through sustainable development in all its operational clusters (domestic and international energy, chemicals, and other business it runs in the petrochemical industry). As discussed in the chapter, key enablers in Sasol's operations include, among others, the establishment of the Greenhouse Gas Emission Management Committee, Project Everest, Sasol's New Energy entity, and pursuing carbon capture and storage. While the group's business is mainly centred on coal, the major breakthrough towards transition to a low carbon and greener economy has been the shift from coal to natural gas, which more than halves CO₂ emissions per equivalent product produced. Sasol's other low carbon initiatives include the introduction of new generation diesel, water resources management, and the utility of research and development as a driver for cutting edge technology in line with its sustainability commitment. In operationalising its commitment to substantially

reduce its carbon emissions, Sasol has created business units such as the SNE which cut across the group's operations, created to explore new and viable technologies that can be integrated into its core processes to reduce GHG emissions and meet their long-term targets. This has brought further progress on energy efficiency, renewable energy, low-carbon electricity, and carbon capture and storage.

NOTES AND REFERENCES

- 1 Sasol., 2012. Explore Sasol. Sasol. Available at www.sasol.com [Accessed 11 February 2012].
- 2 Sasol; Sustainable Development Report., 2011. Pursuing responsible growth. Sasol, South Africa.
- 3 Sasol business overview report., 2010. Available at www.sasol.com/sasol_internet/frontend/navigation.jsp? Sasol, Johannesburg South Africa [Accessed 12 February 2012].
- 4 Sasol Sustainable Development Report., 2010. Focused and Energised. Johannesburg: Sasol.
- 5 Davies, P., 2010. Chief Executive Statement. Sustainable Development Report: Focused and Energised.
- 6 Ibid.
- 7 Sasol Sustainable Development Report., 2010. Op Cit.
- 8 Sasol Annual review., 2010. Op Cit.
- 9 Ibid.
- 10 Sasol SHE Report., 2002: Sasol SHE Sustainability feature 02SNGP. Available at <http://www.docstoc.com/docs/72646181/Sustainability-is-at-the-heart-of-Sasols-new-Rough-draft-will> [Accessed 15 May 2012].
- 11 Rogers, M. H., 1999. Coal an industry in change. *Journal of South Africa Institute of Mining and Metallurgy*.
- 12 Nexant., 2006. Multiclient Prospectus, Coal to Chemicals, Is it Coal's time again? Available at <http://www.chemsystems.com/reports/search/docs/prospectus/MC-Coal-Chemicals-pros.pdf> [Accessed 10 March 2012].
- 13 Van Dyk, C., Keyser, M. J. and Coertzen, M., 2005. Syngas production from South African coal sources using Sasol-Lurgi gasifiers. *International Journal of Coal Geology*, 65, pp. 243–253.
- 14 Rogers, M. H., 1999. Op Cit.
- 15 Ibid.
- 16 Princiotta, F. T. (ed.), 2011. Global Climate Change. The technology challenge, advances in Global Change Research 38. Springer Science and Business Media.
- 17 Ibid.
- 18 Scott, G., 2011. Reducing mercury emissions from coal combustion in the energy sector in South Africa. UNEP Report. Available at www.unep.org [Accessed 27 February 2012].
- 19 Water Rhapsody., 2010. The energy and water situation in South Africa.
- 20 Glassier, B., 2009. New F-T Process for Synfuels. Good or Bad News for the environment. Fatknowledge Blog. Available at: <http://fatknowledgeblog.com> [Accessed 20 January 2012].
- 21 25 Degrees in Africa., 2011. Energy Management 103: Mining & Industrial Applications Energy in Industry.
- 22 Van Dyk, J. C. et al., 2005. Op Cit.
- 23 Princiotta, F. T., 2011. Op Cit.
- 24 Ibid.

Chapter 6

- 25 Katzer, J. R., 2011. Coal and Biomass to liquid Fuels. Cited in Princiotta, 2011. Advances in Global Change Research 38.
- 26 Ibid.
- 27 Becker, F. W., 1981. The Role of Synthetic Fuels in World WAR 2 in Germany. Air Universal Review. University of South Carolina. Available at <http://www.airpower.maxwell.af.mil/airchronicles/aureview/1981/jul-aug/becker.htm> [Accessed 3 January 2012].
- 28 Princiotta, F. T., 2011 Op Cit.
- 29 Author.
- 30 Princiotta, F. T., 2011. Op Cit.
- 31 Glassier, B., 2009. New F-T Process for Synfuels. Good or Bad News for the environment. Fatknowledge Blog. Available at <http://fatknowledgeblog.com> [Accessed 20 January 2012].
- 32 Van Dyk, C. et al., 2005. Op Cit.
- 33 Author.
- 34 Rogers, M. H., 2009. Op Cit.
- 35 Ibid.
- 36 Ibid.
- 37 Talpers, S. S., Romberger, D. J., Bunce, S. B., and Pingleton, S. K., 1992. Nutritionally associated increased carbon dioxide production. Excess total calories vs. high proportion of carbohydrate calories. *CHEST Journal*, 102(2), pp. 551–555.
- 38 Brodovsky, D., Macdonell, J. A., and Cherniack, R. M., 1960. The respiratory response to carbon dioxide in health and in emphysema. *Journal of Clinical Investigation*, 39(5), pp. 724–729.
- 39 Ziska, Lewis. H. and Caulfield, F. A., 2000. Rising CO₂ and pollen production of common ragweed (*Ambrosia artemisiifolia* L.), a known allergy-inducing species: implications for public health. *Australian Journal of Plant Physiology*, 27(10), pp. 893–898.
- 40 Shell Sustainability Report., 2010. Available at <http://www.shell.com/sustainability> [Accessed 25 February 2012].
- 41 Ibid.
- 42 Author.
- 43 Natgas info., 2012. The independent natural gas information site. Gas to liquids GTL. Available at <http://www.natgas.info/html/gastoliquids.html> [Accessed 10 February 2012].
- 44 Ibid.
- 45 De Klerk, A., 2012. Gas to Liquid Conversion. Natural Gas conversion technology workshop of ARPA-E, US. Dept of Energy Houston TX. Available at <http://arpa-e.energy.gov/LinkClick.aspx?fileticket=-iCohV-OtOLEper cent3D&tabid=467> [Accessed 10 February 2012].
- 46 Natgas info., 2012. Op Cit.
- 47 De Klerk, A., 2012. Op Cit.
- 48 Ibid.
- 49 Dry, M. E. and Steynberg, A. F., 2004. Surf Scie. Catal. 152. 406–481. pp. 436.
- 50 Gary, J. H., Hendwerk, G. E., and Kaiser, M. J., 2007. Petroleum refining technology of economics. (5ed). Bocaraton: CRC Press. pp. 6.
- 51 Crow, M. J., Bozerman, Meyer. W. and Shangraw, R., 1988. Synthetic fuel technology development in the USA. A Retrospective Assessment. New York: Praeger.
- 52 Petroleum economics., 2008. 75(6), pp. 36–38.

- 53 Author.
- 54 Engen., 2012. Available at http://www.engen.co.za/home/apps/content/environment_society/iso_9001_14001/default.aspx [Accessed 27 February 2012].
- 55 Author.
- 56 Engen., 2012. Op Cit.
- 57 Ibid.
- 58 Ibid.
- 59 Ibid.
- 60 Ibid.
- 61 Shell Sustainability Report., 2010. Op Cit.
- 62 Engen., 2012. Op Cit.
- 63 Sasol Sustainable Development Report., 2011. Op Cit.
- 64 Sasol Sustainable Development Report., 2011. Op Cit.
- 65 Sasol's fast facts., 2011.
- 66 Sasol Sustainable Development Report., 2011. Op Cit.
- 67 Ibid.
- 68 Sasol's fast facts., 2011.
- 69 Ibid.
- 70 Ibid.
- 71 Sasol Annual review., 2010. Focused and energised: revised and summarised annual financial information. Sasol SA.
- 72 Sasol's fast facts., 2011.
- 73 Ibid.
- 74 Sasol Sustainable Development Report., 2010. Op Cit.
- 75 Ibid.
- 76 Ibid.
- 77 Ibid.
- 78 Sasol Energy Efficiency Case Studies., 2011. Projects from the Pipeline.
- 79 Sasol Sustainable Development Report., 2011. Op Cit.
- 80 Sasol Energy Efficiency Case Studies., 2011. Op Cit.
- 81 Ibid.
- 82 Sasol SHE Sasol Sustainability feature 02 SNGP (6) 22.
- 83 Ibid.
- 84 Ibid.
- 85 Sasol Energy Efficiency Case Studies., 2011. Op Cit.
- 86 Sasol Fast Facts., 2011.
- 87 Ibid.
- 88 Sasol Sustainable Development Report., 2010. Op Cit.
- 89 Sasol Fast Facts., 2011.
- 90 Sasol Fast Facts., 2010.
- 91 Sasol Fast Facts., 2011.

Chapter 6

92 Sasol Fast Facts., 2010.

93 Sasol Fast Facts., 2011.

94 Sasol Sustainable Development Report., 2011. Op Cit.

95 Ibid.

96 Security and Exchange Commission., 2011. United States Annual Report, Pursuant to Section 13 or 15(d) of the securities exchange Act of 1934.

97 Sasol Sustainable Development Report., 2011. Op Cit.

Pele's renewable energy packages for households and small businesses across Africa

Fumani Mthembi

ABSTRACT

This chapter describes Pele Green Energy's entry strategy into the rest of Africa through the distribution of off-grid energy generation units. While the case is increasingly made for micro-finance institutions to provide lending and savings solutions for energy products, the business sensibility of this decision - from the product distributor's perspective - is seldom interrogated. The opacity of undeveloped markets, weak governments, poorly coordinated electricity production and supply, as well as pervasive poverty, is seen as being amongst the greatest constraints to participating in the energy markets as a commercial entity. However, developments in the Asian technology markets, coupled with new insights about how to package products and distribution methods for low-income consumers, make it possible to significantly mitigate business risks. Therefore, it is argued that there is a growing opportunity for distributors of energy efficiency products to partner with micro-financiers and technology providers, in delivering energy to those previously excluded from modern energy supply.

INTRODUCTION

Pele Green Energy's (Pty) Ltd (Pele) renewable energy packages for households and small businesses across Africa stood out to be a flagship in the embracing of the green economy by small and emerging companies. Pele was founded in September 2009 by a group of young South African entrepreneurs. The business is located in Johannesburg, South Africa, but has an increasing footprint in other parts of the African continent. Pele is primarily an Independent Power Producer (IPP) that develops power-generation capacity in the renewable energy sector.

In the short-term, the business strategy entails participating in energy projects as equity and/or technical partners. Given that this industry is in its relative early stages, Pele enters into projects, often with more experienced non-African partners, with the view to undergo intensive, on-the-project learning. This is a deliberate strategy to ensure that skills currently held outside of Africa are genuinely transferred. In terms of the value chain, this means a transfer of skills in project development, engineering design, operations and management, as well as technology design.

The business' long-term goal¹ is to be an energy utility that has the requisite balance sheet, technology and skills to originate, execute and implement power generation projects. In tandem with this, the business places emphasis on social investments and therefore, has a team dedicated to researching and designing solutions that enhance the economic participation of the communities in which Pele works.

Pele states its values² as being:

- **Value-addition:** to always add value to its teams, partners and share-holders.
- **Economic progress:** to ensure that the business contributes to economic growth and expands participation.
- **Constant learning:** to lead through constant expansion of its own and the collective knowledge base.
- **Self-reliance:** to maintain independence as a business and to foster it through all operations.

By virtue of a policy framework that outlines the South African government's 20 year plan for national electrification, it has been possible for Pele to design a business strategy for participating in the South African energy sector.³ Importantly, the local energy infrastructure allows independent power producers to supply power to an established national grid, and additionally, via off-grid projects for ring-fenced consumers.⁴ This approach, however, cannot be simply replicated in the rest of sub-Saharan Africa - a market Pele intends to serve.

The following sections will outline the historical electrification conditions that persist on the African continent and more broadly, the perceived barriers to business-led economic development, with a specific focus on the energy sector. By reviewing and analysing the literature, a richer context will be provided for the breakthrough. This is then followed by a detailed description of the breakthrough, which also demonstrates the ways in which historical barriers are being addressed through the new business model. This chapter aims to contribute to the growing body of case studies on off-grid energy solutions that are being distributed across the African continent through micro-finance institutions. It is unique in its focus on the suppliers, in this case Pele, as it interrogates the requisite conditions and business case for scaling Africa's electrification through this type of model.

ENERGY POVERTY AND OPPORTUNITIES FOR RENEWABLE ENERGY IN AFRICA

One interpretation of Africa's unfortunate characterisation as 'the dark continent' is that the darkness refers to the low levels of electrification. Given that this region is also plagued by high-levels of low per capita income, the widespread lack of electricity has a clear poverty correlation.⁵

Energy poverty can be defined as a lack of access to energy, compounded by the lack of the means to access energy resources.⁶ Indeed, research has shown that the per capita energy consumption of energy-poor individuals amounts to a fraction of the energy consumed by individuals in industrialised countries.⁷ Energy poverty has numerous impacts including adverse effects on health due to exposure to indoor air pollution.⁸ The struggle to acquire energy also implies a high labour and time-cost often borne by women.⁹ Furthermore, it is likely that the energy-poor pay more per unit of energy because they are excluded from the scale and network benefits that result in subsidised, on-grid energy. The observed trend has been that the higher up one travels along the energy ladder, i.e. the more connected one is to reliable on-grid energy supply, the more subsidised energy consumption becomes.¹⁰

It is, therefore, unsurprising that energy poverty has become increasingly integral to the broader understanding of the dimensions of poverty. The Johannesburg World Summit on Sustainable Development in 2002 confirmed the centrality of this understanding to programmes and projects aimed at alleviating poverty.¹¹

THE DARK CONTINENT

Energy poverty, although pervasive across Africa, is not a universal phenomenon. It is important to avoid homogenising Africa and its energy needs. Certainly, an understanding of the patterns of electrification across the continent is crucial to an informed business strategy. It is crucial to understand then that while 587 million people in Africa are said to be without electricity, about 585 million (99,7 per cent) are in sub-Saharan Africa (SSA).¹² Combined, Tunisia, Egypt, Libya, Morocco, and Algeria have an average electrification rate of 95,4 per cent.¹³ This means that North Africa's electrification mirrors that of the developed world, while SSA dominates the continent's electrification problem.

Furthermore, while 31 per cent of the SSA population was estimated to have electricity access, this number dropped to 28 per cent after excluding South Africa from that statistic.¹⁴ It is therefore astounding that in the absence of South Africa, the rest of SSA, comprised of about 791 million people, consumed the same amount of electricity as New York City (NYC) in 2009.¹⁵ At the time, NYC's population was only 19.5 million people. Put differently, the entire energy generated in SSA is 68GW – equal to Spain's entire output.¹⁶ Excluding South Africa's output, this figure falls to 28GW, making the entire regional output (bar South Africa) equivalent to Argentina's.¹⁷

SSA is thus dramatically behind the rest of the world in terms of electrification. Compared with other regions, SSA accounts for 585 million of the 1 438 million people from all developing countries and 1 441 million of the entire world population without electricity. This means, SSA accounts for roughly 41 per cent of the world's energy-poor population, although only comprising 14 per cent of the global population.¹⁸

Therefore, poverty exists as a general corollary to energy poverty in most of SSA. From a business perspective, the clear opportunity to electrify SSA has to be considered in conjunction with the conditions for doing business in this region. The following section deals with the conditions that have hindered the ability of business to contribute to development in developing regions such as SSA. These issues were carefully considered by Pele to determine the extent to which they represented a barrier and/or an opportunity for new approaches to the challenge.

BARRIERS TO DOING BUSINESS

There are many ways to characterise poorly developed economies. One can take the view that they are located in geographies that are not conducive to certain patterns of accumulation and thus, of economic growth;¹⁹ one can argue that they have weak governments;²⁰ that they are victims of neo-colonialism;²¹ or even, as is so often the case with Africa, that they are cursed by their mineral resource wealth²² as well as an entrenched culture of corruption.²³

De Soto's²⁴ theory first entered public consciousness at the dawn of the new millennium. It identifies the property rights systems of wealthy nations as being responsible for unleashing productive capacity and growth. De Soto's theory has thus been perceived as developmental in its attempt to point out property as a lever through which the poor can replicate the wealth of industrialised nations.²⁵ De Soto articulates this theory in terms of three core mysteries that pertain to capital formation: the mystery of missing information; the mystery of legal failure; and the mystery of capital.

THE MYSTERY OF MISSING INFORMATION

Drawing from Garret Hardin's, 'tragedy of the commons', De Soto understands market signals to be necessitated by population growth. Hardin²⁶ says that when the population reaches a certain peak level, it becomes necessary to fence the former 'commons' in order to extract maximum value for the efforts of cultivation. Hardin's theory is about the conditions that bring about privatisation. De Soto applies a similar logic to mercantilist economies, to explain not just the need for privatisation, but the role that privatisation plays in unleashing economic growth.

His argument is that when a population reaches a certain level, it becomes necessary to trade with 'strangers', who can only rely on signals to ascertain the value of their trade.

For example, if one is buying a car from a stranger, it is likely that you will require its service records to determine its condition. The inability to *know* the actual value of what you are purchasing from a stranger is due to an information gap. The tale of 'lemons and oranges' is an economics classic, referring to the 'hidden' properties of goods that only become known once the purchase is made. Just because an orange looks good, doesn't mean it is sweet and succulent. De Soto's contribution goes beyond articulating the classic dilemma, but rather interprets the ability to overcome it as a key differentiator between rich and poor countries. A well-oiled capitalist economy has a trustworthy *signal* for all value that cannot be 'seen' or fully known at purchase.²⁷ These signals are usually in the form of documentation. Money is the primary market signal in trade-based economies; it indicates exchange value without literal translation into a good.

The missing information gap for Pele is defined by the company's inability to discern from data a crucial trait such as affordability, given that the markets it was interested in were predominantly agrarian or simply informal. It also wouldn't suffice to base its assumptions on poverty data, as this wouldn't explain how other businesses were thriving in these very economies.

THE MYSTERY OF LEGAL FAILURE

The second dilemma to grapple with related to legal failure. Prosperity does not follow simply from building paper trails to indicate value. For example, if the car industry is run by a notorious gang, it becomes meaningless that a car's service record exists. Documentation is crucial but its sources must also be reliable for it to have value. The large-scale market cannot function without trust, something which has to be built into and expressed through a legal framework.²⁸

Legal recognition and validation of signals are necessary to guarantee the value of signals themselves and to make the economy more efficient.²⁹ So, while money is itself valueless, its ability to indicate tangible value is guaranteed by its status as 'legal tender'. Similarly, the legally binding implications of a car's service record make it a valuable market signal. De Soto's argument is that poor countries are endemically poor at generating market signals, and their inability to secure their signals through the law compounds their economic growth problems. In other words, if the legal system is unable to issue market signals as and when they are required, (e.g. reign in criminal activity that creates fake signals and settle disputes timeously and fairly) then trust is diminished and the problem of missing information persists.³⁰ Without the certainty provided by a legal framework, transaction costs are increased and economic growth hampered.³¹

How then would Pele navigate unfamiliar, possibly weak legal systems, if contracts were to be at the heart of its cross-border business?

THE MYSTERY OF CAPITAL

Finally, De Soto³² argues that it is not good information and legal systems that explain the success of wealthy nations. While effective market signals create the lubricant for trade, there is one particular type of market signal that is crucial for growth: property rights. Property rights are generally understood to encourage innovation and economic growth because they internalise both negative and positive value, or costs and profits.³³

De Soto concerns himself more with property in the form of bricks and mortar. According to the theory, the right to property, as indicated by a title deed, is the single most important market signal for incentivising investment and capital formation.³⁴ This is particularly relevant to developing countries because, as he argues, property is the one asset that the world's poorest has in abundance. It may be a shack in an urban slum or a plot in a rural village, but the bulk of the world's poor possess property that is collectively worth trillions of dollars.³⁵ The only thing they lack is the signalling ability to indicate its value - this is what makes their capital 'dead', lacking in the vitality to truly work for them.

De Soto argues that when people are granted titles to their homes, they are given ownership of an appreciating asset. Because land is a resource limited by nature (unlike labour and capital, which are socially limited), its scarcity is considered to be ever-rising, meaning that its value is similarly ever-increasing.³⁶ Ownership of such property makes it possible to leverage its security to unleash capital for other productive purposes. This means that money can be borrowed against the asset for investment in other profit-making enterprises. Therefore, in principal, loans made against property are large and can attract lower interest rates because the average borrower's preference for losing their home is very low.³⁷

Unlocking 'dead capital' in the developing world by means of assigning property rights is thus De Soto's solution for making capitalism work for the poor. While De Soto makes a good point, the theory doesn't resolve the reality. The question for Pele would be related to the implications of providing energy assets, possibly through credit extension, to people without the requisite security to make the risk worthwhile. The problems with the contexts in which Pele wants to serve can thus be summarised in terms of the dilemmas of missing capital, missing information and poor legal systems. In addition, the challenge of poor grid infrastructure has meant that Pele requires a comprehensive off-grid strategy in order to target a sizable portion of the market.

Finally, Pele took the view that energy poverty provides a lens into the nature of demand or the low-hanging fruit opportunity, as being predominantly located at the household, rather than formal business level. The following section details the manner in which global changes in the fields of micro-finance, energy efficiency, and climate change discourse have created a context which allows Pele to turn the above-stated challenges into clear business opportunities.

FROM CHALLENGES TO GLOBAL CHANGES

The challenges identified above are solved and transformed into opportunities through a combination of factors. This section describes how the centrality of climate change has solidified business opportunities in the renewable energy sector. Furthermore, through the establishment of a global funding mechanism, extending renewable solutions is deemed as a profitable solution to both climate change and energy poverty. At the business level, the questions for Pele are centred on the viability of African markets, as well as the availability of reasonably priced technologies to advance into these markets for off-grid energy generation. Indeed, the aggressive growth and increasing competitiveness of Asia, coupled with micro-finance's ground-up approach of servicing the poor, have served as catalysts for Pele's informed strategy.

The Clean Development Mechanism (CDM) is one of three mechanisms established by the Kyoto Protocol in 1997 to meet the United Nations Framework Convention on Climate Change's (UNFCCC) objective of stabilising greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The other two mechanisms are Emissions Trading and Joint Implementation, both of which are not applicable to developing countries.

The CDM has two objectives: first to assist non-Annex I parties (developing nations) in achieving sustainable development and in contributing to the ultimate objective of the UNFCCC, and the second to assist Annex I parties (developed nations, who have commitments for emission reductions under the Climate Convention) with commitments under the Protocol to reduce greenhouse gas emissions to comply with their reduction targets.³⁸ The CDM allows an Annex I party to implement a project that reduces greenhouse gas emissions or, subject to constraints, removes GHGs by carbon sequestration in the territory of a non-Annex I party. Such a project would be eligible for a Certified Emission Reduction certificate (CERs) or carbon credits. The resulting (CERs) can then be used by the Annex I party to help meet its emission reduction target. The project can also be initiated by a developing country, in which case they need to find a buyer for CERs. This is termed as unilateral CDM.³⁹

Carbon funding is very important for projects that might not benefit from incentives that a state awards for renewable energy. The funds that are raised in the carbon funding market are usually vital in improving the financial viability of renewable energy projects. These funds also improve foreign direct investment in developing countries.⁴⁰

The development of climate change from a discourse to a market is the primary driver for Pele's opportunities. It not only makes the case for renewable energy, but provides levers through which to finance energy projects.

ASIA AND ENERGY EFFICIENT PRODUCTS

The emergence of Asia as a global player has created necessary competition in both technology and price terms. Asia is under pressure to solve its own energy demand as well as participate in the sector at a global level to assert its growing status. This vision is reinforced through the investment patterns of Asia compared to the rest of the world. The World Bank report 'Winds of Change'⁴¹ clearly demonstrates the vast difference between China and the US's view on the green sector. While China spent 4,6 per cent of the GDP on green investments in 2009, the US only spent 0,4 per cent of its GDP for the same sector in that year. The same report also shows that while the US had invested \$94 billion stimulus dollars into green projects, China had invested over twice that amount, \$201 billion dollars into green projects by 2009.⁴²

While Japan has been experiencing extreme economic pressure, it has ensured that it leads the race from a hybrid-technology perspective.⁴³ South Korea is also looking to create a space for itself by investing \$31 billion into green technology research and development.⁴⁴ These aggressive investments from Asia have meant that Western dominance of the technology sector has been reduced. Non-collusive competition tends to favour the poor and thus, as a procurer of energy solutions, Pele's choices are dramatically expanded and its bargaining muscle considerably strengthened.

MICRO-FINANCE

While Asia's growth has widened technology solutions, micro-finance has provided a compelling financial solution for accessing markets with low income levels. That the world has experienced a micro-finance revolution was probably confirmed when Mohamed Yunus was awarded with a Nobel Peace Prize in 2006. In summary, the creator of the Bangladeshi Grameen Bank was awarded the prize *'for their efforts to create economic and social development from below'*.⁴⁵ Established in 1983, the Grameen Bank is credited with having set the tone as the model bank for the poor. It turned around traditional notions of banking by reducing barriers to finance access for the poor.

There are numerous critiques of micro-finance, which range from adverse household impacts due to the generalised preference for female borrowers, to the challenges with measuring the real income effects when loans are attributed to groups rather than the individuals who use them.⁴⁶

However, the main contributions of the micro-finance revolution, especially at the broader business level, pertain to *security*, *affordability* and *access*.⁴⁷ These issues also address the constraints to economic development identified by De Soto. First of all, micro-finance deals with problems of missing information by reducing the distance between the institution and its clients. By locating sales and monitoring agents in the villages where clients live and work, they can literally view and value the assets of the poor. In addition,

the trust issue is dealt with by collectivising risk, i.e. by making access to finance conditional on group schemes, clients naturally act as a check and balance on each other to ensure that they don't disqualify themselves from future access. Thus, rather than seeking security in titled properties, micro-finance reveals the currency in social trust. Finally, micro-finance, and indeed other lessons from commodity and service delivery in the developing world, demonstrates an understanding of how to quantify the needs of the poor in a way that is affordable. In other words, rather than selling a mortgage, a very small loan to buy 10 chicks, secured through a group, is what is necessary and affordable for subsistence farmers.

Micro-finance, as a way of banking and then broadly, as a way of doing business 'at the bottom of the pyramid', has been very influential in demonstrating possibility in otherwise forsaken markets. This has not gone unnoticed by Pele.

RENEWABLE ENERGY EFFICIENCY PACKAGES FOR AFRICA

As a business attempting to advance solutions across Africa, Pele has chosen to approach the African market cautiously but with a fundamental belief in the ability of African markets to work. To this extent, Pele has intentionally crowded out value-laden perspectives of Africa, focusing on unlocking what the company views to be the core drivers to doing business in Africa. Indeed, the very solutions Pele advances are aimed at improving the electricity infrastructure which currently acts as a barrier to 'doing business'.⁴⁸

As a small company based in South Africa, the fundamental question for Pele was summed up as follows: How do we use our advantage as a company operating within an advanced economy infrastructure, to provide energy solutions to African markets that are less developed and difficult to decipher from the outside? The most compelling theoretical framework to explain these challenges was determined to be De Soto's theory of missing capital.

In South Africa, Pele's strategy has been led by opportunities outlined through state policy for on-grid energy production.⁴⁹ However, these market conditions are not widespread across the rest of Africa. The constraints to government-led energy procurement programmes are numerous and diverse.⁵⁰ In some cases, the absence of a national electricity grid means that state control of the sector is at best, limited. Furthermore, the absence of finance to subsidise renewable energy production reduces the state's ability to incentivise the development of the sector. Thus, even where political will may exist, the task of coordinating the renewable energy sector tends to go beyond the capacity of most governments.

There is, however, an immediate opportunity that is presented by dispersed, off-grid energy generation. Pele's break (-through) into the rest of Africa, starting in Senegal, Cameroon, and Niger, has come through the recognition that issues of affordability can be overcome through context-specific distribution models. By context specific, it is meant

that distribution models that are aligned with whatever renewable resource is most abundant, whichever finance mechanism is most accessible and whichever technology speaks directly to the socio-economic need. To this end, Pele is distributing energy efficiency packages that allow households and small businesses to generate their own electricity for specific purposes.⁵¹ These units are solar-powered and financed through local micro-finance institutions (MFI) that use their own system of lending, monitoring, and collecting to ensure that payments are honoured. Thus, Pele's client is the micro-financier, who receives the solar packages on a wholesale basis. Given that the micro-financier's expertise is in the local market, they are able to manage the supply of these off-grid energy units at a retail level. Having understood the constraints and opportunities described earlier, Pele has concluded that cracking the African energy markets will depend on astute distribution models.

The first distribution model they have devised is currently being piloted in West Africa, specifically Senegal, Cameroon, and Niger. To overcome problems of missing information and a lack of physical presence in these countries, Pele is working through local micro-finance organisations. Rather than selling to a diffuse market, Pele has a handful of bulk-buying clients in the form of MFIs. The MFI then sells the energy solution to its individual clients via a credit arrangement. By virtue of knowing the client's credit history, the MFI is able to determine whether the client can afford the solution and their likelihood to repay. This gives Pele the opportunity to leverage its advantage as an energy company that is able to match energy needs to appropriate solutions. Pele's task is, thus, assessing the end-user's needs and then sourcing the correct technology, from the best supplier, at a price that is right. By knowing where to place itself in the off-grid value chain, Pele believes that it has created an optimal distribution model for all parties involved, ensuring that there is sufficient trust between all participants to make business possible.

These solutions also address a market dynamic that has created energy poverty in much of SSA. By moving beyond a delivery model of electricity as a mass, shared-grid system, access can be widened at a much greater pace. Indeed, telecommunication in Africa has spread exponentially through dispersed mobile phones rather than landlines. While it is still early days, an energy revolution may be possible to accelerate through dispersed off-grid solutions as opposed to grid connections.

Prior to implementing the solution, Pele, along with its engineering partner, Lebone Engineering, conducted a study-tour to West Africa. The aim of the trip was to understand the nature of the need and the prevalent market conditions. In a report about the trip, Obakeng Moloabi,⁵² a Pele executive, describes the following:

The first site was a fish market. The market is a fresh fish sales point for the city of Dakar [Senegal]. The clients sell most of their fish immediately after it comes onshore. The problem they face is that of excess fish, which requires storage facilities. Currently, they purchase ice in large quantities for cool storage. The problem with the ice is that it's very expensive and the constant 35°C+ temperatures ensure that the ice melts very quickly. The clients

indicated that they would purchase freezers if the electricity supply was deemed reliable. Their main interest is solar powered freezers.⁵³

The next site visit was to a market dedicated to garment tailoring. When entering the site it was clear to see the dependency on diesel operated generators. The local MFI representative took the delegation to a few of their clients in this market to ask questions on their needs. The clients identified three main needs: powering sewing machines, lighting, and televisions.

On Niger, Moloabi reports:

Our first site visit was to a rural village [that is approximately] 30km outside of the capital city [Niamey]. The community is extremely poor, still using buckets and ropes to draw water from a 10 meter-deep well. The water is used for both washing (children are washed on the spot) and drinking. There is no purification system for the water that is drawn from the well. Our second visit was to a medium-scale farmer. This farmer is already using solar-powered pumps for one of his water wells. The size of the farm is considerably larger than the plots we saw on our first site visits. Nevertheless, the larger farms still have a large dependency on diesel operated generators. The average depth of the water pump needs to be around 20 meters. The farmer indicated to us that the maximum depth is around 50 meters.⁵⁴

The above accounts describe the specific contexts and needs that Pele's solutions intend to address. Rather than aggregating the country's conditions to a macro-level, which necessarily requires solutions at that scale, our approach is to address the diversified local needs. In a context where income is constrained, expenditure on electricity is targeted rather than generalised. The communities described in Senegal and Niger identified very specific needs for electricity in order to achieve specific outcomes. This is not to negate a wider range of electricity applications but rather, it is a way of prioritising needs relative to affordability. This is a fundamental difference between on- and off-grid supplies, and necessitates a new business and distribution model.

Figure 7.1 depicts the manner in which the solution works. Pele, having an expertise in the energy sector, assesses the needs of the micro-finance client-base and then surveys the market for solutions that offer the best technology at the most appropriate price.

Figure 7.1 High-Level Distribution Model for Energy Solutions in current pilot⁵⁵

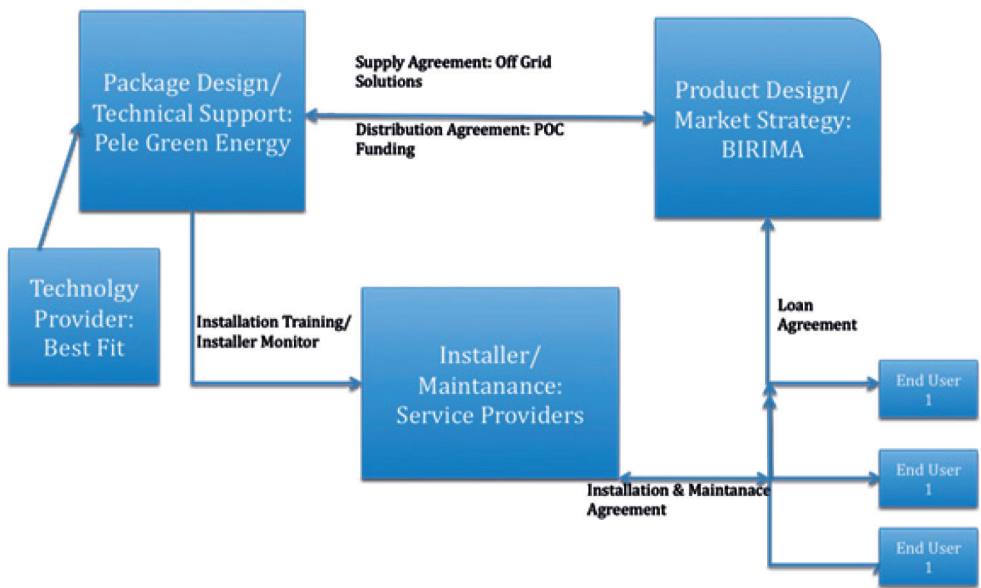


Table 7.1 below shows a summary of how the various units have been procured by the various micro-finance partners in different countries to pilot the viability of the offering. The units pair the energy-generation solution, in this case solar, with a tailored product set such as a TV and lights or lights and fan, etc. The pricing is in United States of America (US) dollars for universality. Because the primary test of the current test is technological, the end-users will be given the units for free by the MFI.

Table 7.1 Summary of the Current Types and Sizes of Units Ordered per Pilot site

Cameroon			
Product Set	Electricity solution set	Order Size	Price/Unit
Small TV (required 6 hours/day) 3 LED lights (required for 12 hours/day)	Solar panel and battery	15 units	\$658
TV (required 12 hours/day) 3 LED lights (required for 12 hours/day)	Solar panel and battery	10 units	\$1,150
Senegal			
Product	Electricity solution set	Order Size	Price/Unit
8 fan (required for 18 hours/day) 3 LED 1,5W lights (required for 12 hours/day)	Solar panel and battery	10 units	\$484
Fan (required for 8 hours/day), 3 LED 1,5W lights (required for 12 hours/day) TV (required for 6 hours/day)	Solar panel and battery	15 units	\$1,216

Niger			
<i>Product</i>	<i>Electricity solution set</i>	<i>Order Size</i>	<i>Price/Unit</i>
8 fan (required for 18 hours/day) 3 LED 1,5W lights (required for 12 hours/day)	Solar panel and battery	15 units	\$484
Fan (required for 8 hours/day), 3 LED 1,5W lights (required for 12 hours/day) TV (required for 6 hours/day)	Solar panel and battery	10 units	\$1,216
Water pump (20 metre depth)	Solar panel	5 units	\$2,530

Source: Authors

The micro-finance partners have adopted relevant risk management and credit monitoring methodologies to align with the requirements of the informal sector. Their experience and discernment have resulted in average repayment rates of up to 98 per cent.⁵⁶ Due to extensive experience in serving this customer segment, the partners will issue credit for off-grid solutions and handle all collections. Pele does not have any credit risk as it distributes the products on a cash basis.⁵⁷

The off-grid solutions require minimum skilled engineering work as they are turn-key solutions that can be operated by unskilled individuals. This means that the complexity of the solution will determine the need for a skilled engineer, in other words the more complex a solar solution system is (e.g. hybrid systems), the greater the need for a skilled or semi-skilled electrical engineer.

A local technical partner in each country will be appointed to ensure on-going dialogue and support with clients and partners. Training will be provided and a customer care/support office established in each country to promote job creation. In the long term, Pele's goal is that parts of, or whole, solutions be assembled in the region or in each respective country.

CONCLUSION

This breakthrough has attempted to showcase a business model innovation as a core driver for entering markets that are uniquely configured. While the renewable energy sector is rapidly developing, entities with an interest in Africa must also set out to understand the various African markets to ensure that the continent does not miss out on this energy revolution. Indeed, Africa is not a country and thus, various solutions will require specific tailoring in the different country contexts. To the extent that regions share common institutions or business cultures, there exists space for standardising high-level business models.

Pele Green Energy, as an entity with an interest in going beyond South Africa, has done just that. This chapter also unpacked the key theoretical and practical issues which

informed the kind of SWOT (strengths, weakness, opportunities, and threats) analysis the business conducted. As a result of their analysis, they concluded that capitalising on the apparent opportunities required a novel distribution model. To this end, Pele created a model that allowed it to focus on its core competencies while ensuring that various elements of risk were spread accordingly, along the value chain. The pilot that Pele is currently rolling out in West Africa will start to answer some crucial questions, including:

- How to manage a project across borders and the timeframe implications
- How to deal with constraints in terms of infrastructure and skills as this would impact the prospects for larger-scale rollout
- What level to provide to MFI, as there is scope for improved project structuring and funding if they are to operate on a larger scale, with international partners
- How to manage foreign exchange risk by hedging appropriately
- What types of contractual arrangements are required with partners in order to ensure that participation aligns with project needs rather than traditional service/product provision.

This chapter explored the demand for energy efficiency products as demonstrated through the low electrification rates in sub-Saharan Africa, a clear reflection of the deep energy poverty that persists in the region. It also provided an in-depth look into the challenges of doing business in Africa. However, the negatives were juxtaposed against key positive factors such as the introduction of carbon markets, Asian technology, as well as micro-finance as structural drivers for business at 'the bottom of the pyramid'. Rather than make a case for MFI's to participate in distributing energy efficiency or off-grid solutions,⁵⁸ this chapter sought to explore the considerations governing the suppliers who stand between technology providers and the MFI. Pele, being one such actor, is in the process of unpacking the exact details of the supplier business case. The question at this stage is no longer whether to participate, but rather how to distribute the hours of current sunlight most optimally.

NOTES AND REFERENCES

- 1 Pele Green Energy., 2011. Information Memorandum: The Investment Case. Johannesburg: Pele Green Energy Pty.
- 2 Pele Green Energy., 2011. Op Cit.
- 3 The Integrated Resource Plan 2010 released by the SA Department of Energy outlines the country's 20-year energy plan. This states that renewable energy should contribute 30% of national energy by 2030.
- 4 The Integrated Resource Plan., 2010. Op Cit.
- 5 Pachauri, S. and Mueller, A., 2004. On Measuring Poverty in Indian Households. *World Development*, 32(12), pp. 2083–2104.

- 6 Ibid.
- 7 Sagar, A., 2005. Alleviating Energy Poverty for the World's Poor. *Energy Policy*, 33, pp. 1367–1372.
- 8 Spalding-Fecher, R. and Winkler, H., 2005. Energy and The World Summit On Sustainable Development: What Next? *Energy Policy*, 33, pp. 99–112.
- 9 Ibid.
- 10 Sagar, A., 2005. Op Cit.
- 11 Pachauri, S. and Spreng, D., 2004. Op Cit.
- 12 IEA- International Energy Agency., 2010. Energy poverty: How to make modern energy access universal? Organisation for Economic Cooperation and Development and IEA.
- 13 The highest among these is Tunisia with 99% electrification and the lowest among these is Morocco with an electrification rate of 85%. UNDP-United Nations Development Programme (2010): 2010 Human Development Report, Statistical Tables.
- 14 It should be noted that South Africa's electrification rate is 70% while Mauritius, also in sub-Sahara Africa has a rate of 94%. The next highest ranking SSA country is Cote d'Ivoire with a 50% electrification rate.
- 15 IEA- International Energy Agency., 2010. Op Cit.
- 16 PNCI- The Paris-Nairobi Climate Initiative., 2011. Access to clean energy for all in Africa and countries vulnerable to climate change.
- 17 Ibid.
- 18 This is calculated as 984,2 million Africans relative to a world population of 6,8 billion in 2010. UNDPES- United Nations Department of Economic and Social Affairs (2004), Population Division (2009): World Population to 2300, United Nations.
- 19 Diamond, J., 1997. Guns, germs and steel: The fate of human societies. WW Norton and Company.
- 20 Mbeki, M., 2009. Architects of poverty: Why African capitalism needs changing. Johannesburg: Picador.
- 21 Meredith, M., 2005. The state of Africa: A history of fifty years of independence. Great Britain: The Free Press; Easterly, W., 2006. The white man's burden: Why the West's efforts to aid the rest have done so much ill and so little good. United Kingdom: Oxford University Press.
- 22 Sachs, J. and Warner, A., 2001. Natural Resources and Economic Development: The Curse of Natural Resources. *European Economic Review*, 45, pp. 827–838.
- 23 Khan, M., 2006. Corruption and governance in the new development economics after the Washington consensus. (Edited by Jomo, K. S. and Fine, B.)
- 24 De Soto, H., 2000. The mystery of capital: Why capitalism triumphs in the west and fails everywhere else. Basic Books.
- 25 Home, R. and Lim, H., 2004. Introduction to Demystifying the Mystery of Capital. London: The GlassHousePress. pp. 1–10.
- 26 Hardin, G., 1968. The Tragedy of the Commons. *Science*, 162, pp. 1243–1248.
- 27 De Soto, H., 2000. Op Cit.
- 28 Ibid.
- 29 Joireman, S. F., 2008. The Mystery of Capital Formation in Sub-Saharan Africa: Women, Property Rights and Customary Law. *World Development*, 36(7), pp. 233–246.
- 30 De Soto, H., 2000. Op Cit.
- 31 Joireman, S. F., 2008. Op Cit.
- 32 De Soto, H., 2000. Op Cit.

- 33 Dunning, J. H., 2003. Some Antecedents of Internalisation Theory. *Journal of International Business Studies*, 34(2) Focused Issue: The Future of Multinational Enterprise: 25 Years Later, pp. 108–115.
- 34 De Soto, H., 2000. Op Cit.
- 35 Ibid.
- 36 Montgomery, J. D., 1984. Land Reform as an International Issue, in *International Dimensions of Land Reform*, Westview Press/Boulder and London. pp. 1–6.
- 37 Sitkin, S. B. and Pablo, A. L., 1992. Reconceptualising the Determinants of Risk Behaviour. *The Academy of Management Review*, 17(1), pp. 9–38.
- 38 Yamin, F., 2005. Climate Change and Carbon Markets: A Handbook of Emissions Reduction Mechanisms. Available at <http://www.ntd.co.uk/idsbookshop/detail.asp?id=854> [Accessed on 20 December 2011].
- 39 Yamin, F., 2004. Op Cit.
- 40 Yamin, Y. and Depledge, J., 2004. The International Climate Change Regime: A Guide to Rules, Institutions and Procedures. <http://www.ntd.co.uk/idsbookshop/detail.asp?id=848> [Accessed on 20 December 2011].
- 41 World Bank., 2010. Path to Energy Sustainability: Transformative Policy Tools and Financing Mechanism in Winds of Change: East Asia's Sustainable Energy Future.
- 42 Ibid.
- 43 World Bank., 2010. Op Cit.
- 44 Bacani, C., 2005. Asia Challenges the U.S. for Green-Tech Supremacy. Available at <http://www.time.com/time/world/article/0,8599,1906704,00.html#ixzz1kfKXvSo2> [Accessed 1 February 2012].
- 45 Nobel Media., 2006. The Nobel Peace Prize 2006. Available at www.nobelprize.org/nobel_prizes/peace/laureates/2006 [Accessed 1 February 2012].
- 46 Morduch, J. and Armendariz de Aghion, B., 2005. The economics of microfinance. Cambridge Massachusetts: The MIT Press.
- 47 Prahalad, C. K., 2006. The fortune at the bottom of the pyramid: Eradicating poverty through profits. New Jersey: Wharton School Publishing.
- 48 Ibid.
- 49 By on-grid energy, we mean energy that is produced for a mass-distribution network, which usually serves a diverse range of users over an expansive territory. These networks are usually state-owned and/managed. Off-grid energy is energy produced for a single end-user or for a limited set of users who are defined by their needs and/shared geographical location.
- 50 Moloabi, O., 2010. Assessing the Off-grid Opportunity in Africa. Pele Green Energy.
- 51 Moloabi, O., 2011. Mission Report: Project Bright Continent. Pele Green Energy.
- 52 Ibid.
- 53 Ibid.
- 54 Ibid.
- 55 Ibid.
- 56 Ibid.
- 57 Ibid.
- 58 See for example, CIAI – Centre for Inclusion at Action International., 2011. Micro Finance and Energy Poverty: Findings from the Energy Links Project. Final Report to AED (now FHI 360) and USAID under the FIELD Project (publication no.13)

FirstRand's responsible financing and the green economy

Godwell Nhamo

ABSTRACT

The FirstRand group sees itself as having an influence in the green economy through its responsible investment agenda. The group cites the need to support South Africa's low carbon and green economy agenda as one of the key drivers within its operation. Reported changes in climate and weather impacting negatively on the agricultural sector, especially in Africa to which the group provide extensive financing services, were also highlighted among the drivers. The group also has key investment clients operating in the carbon intensive sectors such as mining and energy that require significant transition towards a low carbon economy. With regards to enablers, FirstRand highlighted its internal mechanisms that are best represented by its network of green and low carbon policies, including the Environment Policy, Energy Management Strategy, ratification of the Equator Principles, as well as the Climate Change Strategy, involvement in the Carbon Disclosure Project (CDP), and being a signatory the South African Energy Accord. Hence, these and other enablers have led the group to institute environmental and social reviews on all business related loans, inclusion of green procurement elements in tender documents, financing renewable energy and energy efficiency and attaining a paperless electronic account statement system in 2010. The WesBank Fairland Home is a testimony in terms of how FirstRand has domesticated the green economy agenda. The eco-Energy Loan and eBucks are just but some of the mini-breakthrough initiatives building the group's responsible investment agenda narrative within the green economy.

INTRODUCTION

The initiatives supporting responsible financing in the green economy at FirstRand were worthy of documenting in line with the theme of this book. The financial sector is central

in the development of many economies. This rule is not an exception to South Africa either. Hence, with the agenda to move towards a low carbon and greener global and South African economy well set, the financial sector must comply with the demands of new generation low carbon and green financing. This chapter interrogates how the FirstRand group has been addressing this new demand and gauges its successes and challenges.

FirstRand provides financial services targeted at personal, retail, commercial, corporate, and public sector entities both within and outside South Africa. Three franchises, namely: First National Bank (FNB), Rand Merchant Bank, and Wesbank assist the group in delivering its mandate.¹ The group, however, also has interests in Outsurance and Momentum. The environmental and climate change policies and specifications are drawn centrally from the holding company which is FirstRand. Given this set-up, a number of mini-breakthroughs could be associated with the franchises.

To have a comprehensive background in terms of the role of the banking sector in the low carbon and greener economy, relevant literature is reviewed. Among the literature reviewed is some covering the response of banks to the call to move towards low carbon and green financing as well as deliberations on regulatory, physical, reputational, competitive, and litigation risks. Overall, the literature section reveals that there has been a strong shift within the banking sector as aspects pertaining to financing green growth are now issues of survival. Although green banking can be traced to as far back as the mid 1990s, the financial crisis of 2008 acted as the tipping point. New banks focusing purely on green financing and investment have emerged. Among the key sectors in which green and/or clean financing is being channelled are: renewable energy, smart transport, energy efficiency, green buildings, and climate resilient urban development. The banks are also doing a lot internally to be climate compliant in order to both mitigate and adapt to the changing climate. Carbon financing and carbon markets are another growing new portfolio for banks.

A LOW CARBON AND GREENER BANKING SECTOR

The positive correlation between good environmental stewardship and performance within the financial sector has long been determined. In 1995, Mr Otti Bisang of the Credit Suisse Group once remarked, 'Good environmental practice and good financial performance go hand in hand'.² It is no secret that the banking sector's level of awareness in terms of its role in a low carbon and greener economy has increased phenomenally since the global financial crisis in 2008. In the 2012 CDP Supply Chain Report that focused on 'Supplier Management in the Low-Carbon Economy', the Bank of America had a stunning revelation. The Bank of America thus indicated:

[O]ur environmental sustainability commitments are playing an increasingly important role in how we are winning business. A growing number of existing clients and prospects are

asking sustainability questions and inquiring about the bank's operations and what it is doing to influence suppliers in reducing their carbon footprint.³

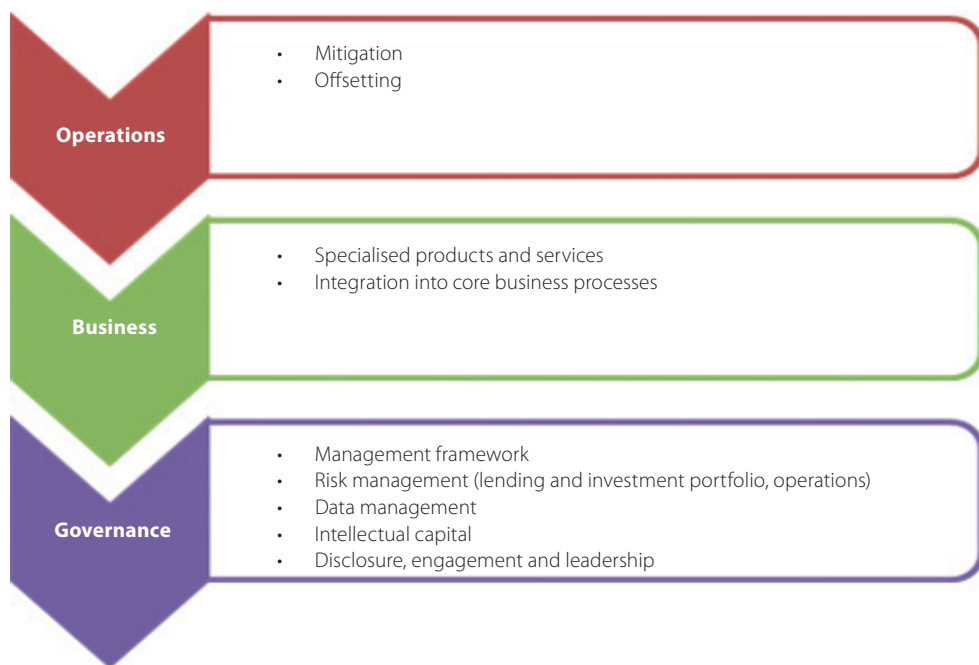
By the time of finalising this chapter, there was overwhelming evidence that the green financing sector was dominated by multilateral development banks (MDBs), especially the World Bank. The World Bank, for example, has more than 10 carbon funds that include among them the Carbon Prototype Fund.⁴ However, the relationship between the MDBs and local banks in the low carbon economy is something that is worth mentioning. The International Finance Corporation (an arm of the World Bank), the Asian Development Bank (ADB), and the African Development Bank (AfDB) all have concluded partnerships with selected local banks to finance green development. For the ADB, local commercial banks are involved in partnerships in Pakistan and Indonesia to achieve greater energy efficiency within the textile, cement, and food industries.⁵

As banks continue to focus on addressing the risk of climate change, it is important to bear in mind that each business area has a different exposure to climate change that are associated with specific characteristics of its activities and asset classes. These exposures are either positive or negative. Hence, what is critical for the banks will be a higher level of confidence when assessing the impacts of climate change on assets. The bank's valuation and due diligence is affected by, especially, the direct impacts of climate change; like extreme weather events, increased input and output costs such as energy supply and carbon emissions, as well as costs imposed by fulfilling regulatory requirements.⁶ The authors also identify climate risks on equities, property, and government bonds that they classify into: regulatory, physical, litigation, competitiveness, and reputational.

Within the equities sector, for example, climate risks from the sub-risk segments include:⁷

- Regulatory: Efforts by governments to regulate greenhouse gas emissions
- Physical: Physical impact of climate change such as floods and storms
- Litigation: Lawsuits against companies emitting large volumes of greenhouse gas emissions
- Competitiveness: Higher costs and lower profit margins due to reactive approach to climate change
- Reputational: Including brand boycotts from consumers in markets where the public is enlightened and is willing to do something in order to force companies to reduce their carbon footprints.

In as much as banks must integrate climate change related aspects into their operational and business processes, well-governed and systematic approaches are crucial to achieve results.⁸ The dimensions and elements of a bank's climate strategy are outlined in Figure 8.1.

Figure 8.1 Dimensions and elements of a bank's climate strategySource: Author⁹

The banking sector is now awash with innovations addressing the green economy. Pavan Sukhdev, a senior banker with Deutsche Bank, indicates that discounted bank loans for developers that are greener are now common.¹⁰ Discounted loans are not a sole innovation in terms of green products from the banking sector. In their analysis of banks and the manner in which they respond to climate change, Furrer, Hoffmann, and Swoboda, distinguish four categories, namely: hesitators, product innovators, process developers, and forerunners.¹¹

In dealing with and supporting green investment and banking, banks need to be aware of their (key) stakeholders and programmes. Such stakeholders and programmes include, among them: capital markets, international financial institutions and donors, United Nations (UN) agencies like the UN Environment Programme and the UN Framework Convention on Climate Change, governments, customers, research and development, rating agencies, auditors, civil society (including the media), international good practices, and banking associations. From Setijawan's point of view, green banking (also interchangeably known as eco-banking, sustainable banking, environmentally responsible banking, and low carbon banking) has potential to increase the number of banks joining international best practices, integrate environmental aspects (especially climate change) in banking risk management, and involvement in green innovations.¹²

Sustainable 'green' banking has grown phenomenally in India. The story of Triodos Bank is impressive in terms of the share of lending taken up by this sector in 2007. Out of the three lending areas of the bank that included nature and environment, culture and welfare, as well as social business, the nature and environment sector took up 40 per cent. The remaining two lending areas shared 33 per cent and 23 per cent respectively.¹³ The major projects financed from the nature and environment sectors included those from renewable wind and hydropower energy.

The United Commercial Bank Ltd (UCB) of Bangladesh provides one of the definitions of green banking from its Green Banking Policy of 2011. Green banking thus refers to:

Efforts of the banking sector to keep the environment green and to minimise greenhouse effects through rationalising their strategies, policy decisions and activities pertaining to banking service business and in-house operational activities. Green banking may be seen as a component of the global initiative from the banks end to save the environment.¹⁴

To operationalise the Green Banking Policy, the UCB put in place a Green Banking Unit that reports to the Audit Committee of the Board of Directors. The Green Banking Unit also includes members from other UCB divisions like General Banking and Development Division. The aim of the Green Banking Policy is to ensure that measures to protect environmental pollution and improve internal environmental management are put in place. This will be done through efficient resource use that includes 'reducing usage of paper, water, use of energy efficient lights and equipment', amongst others.¹⁵ In addition to the enrichment of the external environment, green banking in the UCB addresses other aspects (see Box 8.1 below).

Box 8.1: Other facets of green banking at UCB¹⁶

- Improve the image of the Bank by showing and serving its commitment to the environment.
- Significantly reduce operational costs due to less consumption of office stationeries, energy, and water.
- Enhance productivity as well as efficiency of the employees through skilled and optimum usage of technology.
- Reduce possible health hazards by installing eco-friendly equipment.
- Save significant portion of forestry by reducing paper usage.
- Lessen emission of Green House Gases (GHGs) by reducing corporate travelling through tele-conferencing as well as arranging transport pool for the employees.
- Help develop customer's consciousness on the environment by arranging awareness development programmes.
- Reduce the extent of Non-Performing Loans (NPLs) if investment goes to less risky projects.

Among some of the green banking initiatives from UCB are: green finance, climate risk fund, green marketing, online banking, disclosure and reporting green banking activities,

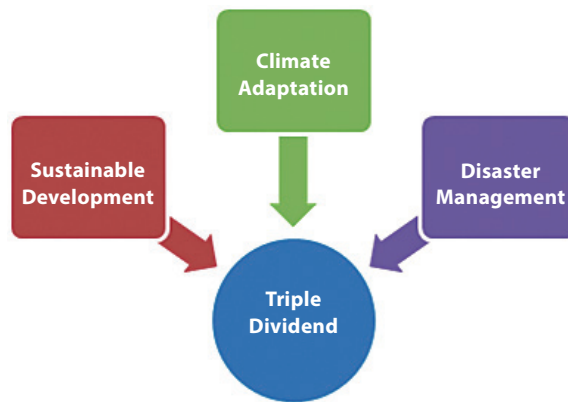
as well as employee training, consumer awareness, and green events. Under the green finance initiative, for example, financing is released for eco-friendly business activities and energy efficient industries. Investments are targeted in green infrastructure like renewable energy, clean water, waste disposal, biogas plants, and bio-fertiliser plants. From the retail side, loans are provided under conditions that promote good environmental practices. Financing economic activities related to weather extremes like floods, droughts, and cyclones is also provided at regular interest rates without charging additional premiums.¹⁷

Kostas Vassiliou adds more opportunities associated with green banking. These include increasing the demand among businesses and individuals for green products and services; excellent prospects of growing dynamic export oriented green sectors, particularly in the renewable energy and energy efficiency sectors; and good chances to attract foreign direct investment (FDI).¹⁸ On the limitations side, green banking is faced with challenges regarding the infancy of most green industries, liquidity problems (as in short term versus long term investments), regulatory regimes, as well as limited knowledge and expertise of the low carbon and green economy.¹⁹ Kostas Vassiliou also adds more on the obstacles. The author concedes that green scepticism is still high in the market, and so continuous encouragement by key stakeholders is needed; and clear policy directions from global and national governments. State bureaucracy is cited as a barrier, especially in the field of environmental and town planning, as a number of development licenses must be issued from these offices.²⁰ Banks are concerned with potential changes in the legal and tax framework during investment periods. South Africa's shift regarding Renewable Feed-in Tariff regulations is a typical example as the government had to move to bidding instead. Of late, there seems to be too many 'experts' in the field of green banking and this distorts understanding of the emerging concept.

Aspects relating to regulation are becoming more elevated by the day. As far back as 2004, the China Bank Regulatory Commission instructed banks to stop lending to projects that did not comply with relevant environmental laws. This was followed by another request to have banks assess environmental risks in loan applications in 2007. During the same year, the Chinese government put in place the Green Credit Policy and established the National Climate Change Programme that focused on cutting greenhouse gas (GHG) emissions by 10 per cent in 2020. In addition, the China Industrial Bank joined the Equator Principles in 2008, and four other banks joined the United Nations Environment Programme Finance Initiative (UNEP FI).²¹ With regards to the ushering in of the green economy, the UNEP FI indicated in October 2007 that financial institutions were starting to grasp money-making realities from delivering sustainability to the corporate and retail clients. Among others, the UNEP FI lists tangible benefits from green products and services in the banking sector, among them being improved market share and profits, environmental awareness and stewardship, as well as strengthened relationships with outside key stakeholders.²²

In the review, UNEP FI covered retail and corporate banking, asset management and insurance. The findings were that environmental knowledge and media coverage, environmental awareness and public opinion, as well as environmental regulation and legislation were the key drivers in green product and services development in the financial sector. Under retail banking, products included green mortgages, home equity loans, commercial and building loans, car loans, and credit cards.²³ From corporate and investment banking, products and services included green project finance, securitisation, venture capital and private equity, green indices and carbon commodities. From asset management, products and services included green fiscal funds and investment funds, as well as carbon funds. Green insurance and carbon insurance featured under the insurance sub-sector. The UNEP FI makes a special plea for the financial sector in terms of how it should address issues of climate change adaptation. It recommends that the sector should 'recognise the reality of climate change and mainstream it into all business processes, develop and supply products and services for the new markets, work with policymakers to realise the transition to integrated adaptation and ensure that contingency plans consider "worst case" disasters'.²⁴ The UNEP FI further realises that in order to cope with climate change there is need for financial institutions to 'build local capacity and resilience for a win-win-win situation' yielding a triple dividend in the payback for the scarce resources (Figure 8.2).²⁵

Figure 8.2 Objectives of effective adaptation



Source: Author²⁶

In forward-looking planning scenarios addressing temperature changes and the concentration of carbon dioxide (CO₂) in the atmosphere to 2045, the UNEP FI team had convincing revelations for the banking sector if adaptation was not considered. At 380-405 ppm of CO₂ in the atmosphere expected between 2005 and 2015, banks would have insurance cover in place. As CO₂ increase to 435 ppm in 2025, customers would start defaulting due to weather extremes. As the CO₂ concentrations rise further to 465 ppm in 2035, collateral

values fall and projects fail. Lastly, major projects will be shelved and lending falls by 2045 with CO₂ concentration at 505 ppm.²⁷

In 2009 the Irish Banking Federation (IBF) put in place the Climate Change Principles for the Financial Sector. The banks supported a drive to cut GHG emissions and encourage regulatory and legislative changes in the country to address climate change. The IBF Climate Change Principles for the Financial Sector will guide banks in addressing²⁸ energy financing, waste management, customer services, and investment in, and financial structuring of, commercially viable transactions in the operations management. Further details regarding the principles can be obtained from the IBF.

Green and low carbon banking has certainly grown to higher levels. Following the financial crisis in 2008, a number of banks focusing purely on financing green growth in their countries and abroad have emerged. Among such is included the Green Investment Bank of the United Kingdom, and a number in the United States of America (US) that include ShoreBank Pacific, New Resources Bank, First Green Bank, Green Bank, e3bank, and Green Choice Bank.²⁹ As we move into the future, more such banks are expected to operate.

THE CASE FOR A GREENER FIRSTRAND

As a financial institution which is intricately involved in the local and international economy through its financing activities, a key driver for FirstRand to transitioning to a low carbon and greener economy is the support of the national agenda. FirstRand makes it clear that the South African government's green agenda is strong, with the writing on the wall to drive to a greener economy. Such an economy would not only see moves towards addressing the negative impacts of climate change, but would harness opportunities in creating sustainable green jobs.³⁰ In addition, the group sees the shortage in natural resources globally in relation to minerals and water. To this end, it acknowledges that the current nature of the resource intense economy that exists is not sustainable. Hence this has triggered the development of innovative and adaptation practices for the FirstRand business. Natural resources shortage will not only negatively impact on the operations of FirstRand, but also on its clients who support the economy. Changes in the climate are reported to impact the agricultural sector severely,³¹ especially in Africa where the group provides extensive financing services. Furthermore, a large portion of the bank's key investment clients operate in the carbon intensive sectors such as mining and energy that require significant transformation and transition towards a low carbon and greener economy.

Another driver is the benefit of financial savings that have been achieved through in-house energy efficiency programmes, which have successfully shown how a greener operation is more efficient and cheaper in the longer term. This also assists in the sustainability of the FirstRand group as a whole. Such learning points can be passed onto the clients to

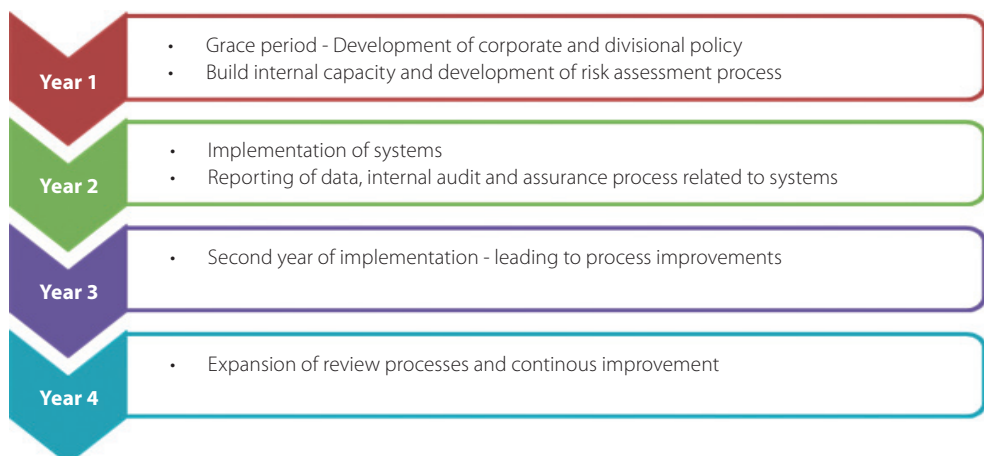
ensure that in the long term they are more sustainable. This is an element that ensures that their relationship with FirstRand is a sustainable one. One cannot rule out competition from other players in the sector both locally and internationally. This is an aspect that is shaped more by perceptions from existing and potential clients. In this regard, the FirstRand group must be seen to be a responsible environmental steward, particularly in the face of increasing climate change threats. The FirstRand group recognises that the transition to a low carbon and greener economy is inevitable, and will very shortly be driven by demand from the regulators and new generation climate-compliant clients.

ENABLERS

Key enablers to FirstRand's transition to a low carbon company, as well as transition to low carbon and green economy are best represented by its network of green and low carbon policies that include: the Environment Policy, Energy Management Strategy, subscription and the ratification of the Equator Principles, the Environment Health and Safety Policy as well as the Climate Change Strategy, and being a signatory of the South African Energy Accord. FirstRand is also part of the Carbon Disclosure Project and provides annual reports to society from all its subsidiaries.

In July 2009 the FirstRand group ratified the Equator Principles. The Equator Principles require that applications to all structured project finance activities where the capital costs are US\$10 million plus be subjected to Environmental and Social Risk Analysis (ESRA).³² The FirstRand group has made significant progress towards implementing the Equator Principles and ESRA and this has become part of their loan application process (see Figure 8.3 below).

Figure 8.3 Progress in Implementing the Equator Principles



Source: FirstRand³³

The phases of development reflected in Figure 8.3 had other aspects that require highlighting. In Year 1 (July 2009), for example, the FirstRand group developed the FirstRand policy related to the management of environmental and social risks in lending. This was followed by the signing of the Equator Principles in the same month. In Year 2, there was the internal gap analysis in relation to the Equator Principles. This was followed by the affected operations implementing the improved recommendations from the internal gap analysis. Year 2 also marked the first year of completed statistics generation for the Equator Principles and this was followed by continuous monitoring of compliance to set processes and annual review of policies and processes. During Year 3, the recommendations from internal audit and/or internal assurance processes were implemented. This resulted in work flow into Year 4, where selected operations had to implement recommendations from continuous monitoring and review of the expansion of processes to other lending activities not initially included.

Climate change has been raised to FirstRand's corporate strategy. This has resulted in the development of a Climate Change Strategy and a proclamation in a Climate Change Statement by the group in 2010. The Climate Change Strategy presents the manner in which FirstRand addresses associated risks and opportunities to the phenomenon, as this either directly and/or indirectly impacts on FirstRand's sustainability.³⁴ In managing direct risks associated with climate change, the group continuously measures, monitors and verifies its carbon footprint. Measuring and monitoring carbon footprint at FirstRand was initiated in 2007. However, the most reliable baseline for the South African operations was completed in 2008. The direct (Scope 1), indirect - mainly from electricity consumption (Scope 2), and selected Scope 3 emissions are included in the calculations that are done quarterly. This activity is also part of the key environmental risk performance indicators for the group. The group's carbon footprint is disclosed and verified externally on an annual basis through the CDP Report South Africa. An estimated 90 per cent of carbon emissions for the group are linked directly to energy consumption. This has resulted in FirstRand linking carbon reduction to the energy management strategy. Reducing the group's GHG emissions to as low levels as is practicably possible comes as the preferred option rather than offsetting it elsewhere.³⁵ Reflecting during the launch of the group's Climate Change Statement, the CEO, Sizwe Nxasana, had this to say:

FirstRand has leading governance structures for addressing climate change, have a climate change policy, Board oversight and senior management responsibility, employee training and public disclosure of efforts. This places FirstRand at an advantage for effectively implementing strategy in addressing climate change risks. Sound corporate governance practices position FirstRand to take early action on emerging opportunities related to climate change. As a developing country, we cannot miss the opportunity of transition towards a low carbon economy. Sustainable economic development is not a luxury, but a requirement to strategically position our economy for this century.³⁶

In 2009, the group benchmarked its carbon footprint at 10.2 metric tonnes of CO₂ emissions per capita per full time employee (FTE). To effectively monitor and manage its carbon reduction, FirstRand proclaimed its intention to reduce its per capita CO₂ emissions from its 10.2 metric tonnes to 8.6 metric tonnes by 2012.³⁷ As of 2010, CO₂ emissions per capita per FTE were estimated at 8.7 metric tonnes.³⁸ This indicator means the group was making significant progress towards realising the 2012 target.

FirstRand has a department for environmental risk management, within which specialists on climate change comment regularly on regulations and legislation, and ensure that the carbon reduction programme internally is maintained and managed. FirstRand also takes an active role in initiatives such as the National Business Initiative (NBI) climate change advisory committee, the Banking Association of South Africa Sustainable Finance Forum, Business Unity South Africa, the UNEP FI, and chairs the African task force, specifically for the last mentioned initiative, engaging other African financial institutions in environmentally related topics, and the influence of financial institutions in their respective contexts.

A focus has been placed internally on the role of a financial institution in the achievement of a green economy. FirstRand recognises the importance of its role in achieving many of the South African governments' goals related to a greener economy, and has developed service lines to support this in terms of financing renewable energy projects, looking at innovative ways of financing solar water heaters in low and middle income housing. The group has also introduced sustainable and/green procurement aspects into procurement. The questions assist in evaluating awareness of suppliers to quickly assess environmental impact of their goods and services.

RESPONSIBLE FINANCING AT THE FIRSTRAND GROUP

Given that the FirstRand group's focus on the low carbon and greener economy takes a holistic approach, no single breakthrough initiative could be isolated. To this end, the related initiatives for the group in this sphere are documented as part of its responsible financing agenda.

In terms of a sustainable impact and transition process, the FirstRand group has implemented environmental and social reviews on all business related loans within the divisions of Rand Merchant Bank, FNB, and WesBank. This process engages clients on their environmental and social compliance performance in relation to their businesses, and requests information in relation to environmental performance. In certain instances this is an education process for the clients to ensure that they understand the sustainability aspects of their businesses, and can lead to greener improvements of their businesses. FirstRand is the only South African financial institution to extend this beyond its strictly defined project financing activities into all business related financing activities.

FirstRand's investment banking division, Rand Merchant Bank, has a dedicated team focussed on financing renewable energy projects, assisting clients in submitting tenders for the Renewable Energy Feed-In Tariff (REFIT) process. FirstRand has access to a preferential credit line from a European Bank that allows Rand Merchant Bank to offer clients a competitive rate on loans extended to them for renewable energy projects. Rand Merchant Bank managed to secure the largest portion of debt from the South African banks during the last tender awards process through its clients who won an allocation of the REFIT programme.

The group is also involved in employee awareness campaigns and presentations to stakeholders.³⁹ The Volunteers Programme encourages long term interventions by employees to ensure that there are sustainable impacts included in the communities and operations. FirstRand also takes part in global events promoting climate change stewardship, like the Earth Hour.

The FNB's Card and Core Banking Solutions that deals with cheque and transactional accounts successfully moved to a paperless electronic account statements system during the 2010 financial year.⁴⁰ This shift has been estimated to have reduced paper consumption by 1 529 reams per month, equating 45.87 tonnes of paper from 2 184.3 trees per year.

Under the green product development initiative, FNB has instituted the green building retrofit programme. The Green Building Retrofit Loan was also launched. This is a financing solution based on commercial property energy retrofitting.⁴¹ The Green Building Retrofit Loan has been code-named the 'eco-Energy Loan' as it is based on the concept of an Energy Performance Contract (EPC). The eBucks programme permits customers to obtain a number of products that help mitigate the impact of energy shortage and reduce environmental impact. An example is solar-powered mobile phone chargers. FirstRand does not only finance green buildings, it has implemented this ideology first on its own buildings, and the WesBank Fairland Home is a case in point (see Figure 8.4).

Figure 8.4 FirstRand green building in Fairland, Johannesburg⁴²



In terms of the group's internal energy efficiency programmes, FirstRand currently runs programmes which have an annual savings of R19 million due to technologies implemented. As a result of this, the carbon footprint of the group has been reduced by 25 per cent during the 2010 financial year. FirstRand was also recognised and awarded first place in the CDP in 2010,⁴³ and eighth place in 2011, as a result of its initiatives in climate change risk and management.⁴⁴

The design of the WesBank home in Fairland, Johannesburg (Figure 8.5), has resulted in an energy demand that is 10 per cent less than normal buildings in the country.⁴⁵ The 'green' building has an intelligent lighting system that is able to detect an empty room and switch off the lights. This system has now gained popularity in the country. The complex uses a solar water heating system in selected areas and the air-conditioning economy cycle ensures a 33 per cent kWh saving. There are also recycling facilities in place with paper recycling banks set up at photocopy areas in all departments.

Figure 8.5 Selected design details from WesBank Fairland home⁴⁶



CHALLENGES AND FUTURE PLANS

Awareness amongst regulators as to the role that financial institutions can play in the creation of a green economy has been identified as being at a low level by the FirstRand. Furthermore, the intricacies involved in financing renewable energy projects such as solar water heaters and the requirements of a private financial institution in terms of risk management are often not understood. The indirect impact on financial institutions by external parties, as a result of direct regulations or initiatives on clients, is not well

understood by external parties, and FirstRand has actively been engaging government and external parties to ensure a common understanding on the issues is achieved.

As with many organisations, developing climate-smart and climate-compliant products and services remains significant. To this end, FirstRand plans to continue with cutting edge research, innovation, and investment into green product development. Such products and services are those that enable clients to be energy efficient. The procurement space has not been left in the blind spot either. Although the space is contested, FirstRand continues supporting initiatives by authorities in South Africa to develop effective green economy policies and regulations. As part of its corporate responsibility, the group pledged to continue reporting publicly and in a transparent and fair manner in terms of its carbon performance as well as progress in meeting the stipulated targets. This is so particularly with the CDP.

FirstRand also plans to continue with its internal initiatives to ensure that buildings within the group are as energy efficient as possible. This will be followed by a move into focusing on larger scale alternative technologies such as solar panels for energy. The Rand Merchant Bank will continue to roll out finance within the renewable energy sector in South Africa with expansion plans into Africa and India. A product for competitively allowing for solar water heating finance for low, middle, and upper income clients is in the process of being developed.

The group looks forward to establishing strategic partnerships on programmes such as the low income modular housing programmes to assist in a move to a greener economy for all income levels in South Africa. The FNB retails division has established a strategic partnership with the German Development Cooperation in the development, research, and testing of technologies in relation to modular green low income housing.

Further afield, FirstRand will be searching for green financing opportunities. To this end, the group will investigate ways in which it could link up with the new and emerging financing opportunities in the field of climate change including: the recently operationalised Green Climate Fund of the UN Framework Convention on Climate Change following COP17 (Seventeenth Session of the Conference of Parties) that took place in Durban, and various carbon funds provided by multilateral development banks like the World Bank and the African Development Bank. The bank will also consider financing viable Clean Development Mechanism projects under the Kyoto Protocol both within and outside Africa. This is particularly promising given that the life of the Kyoto Protocol has been lengthened until 2015, with a global treaty to replace the Kyoto Protocol planned to be in place by 2020. A huge carbon market is therefore at hand and opportunities in this sphere should be grabbed.

CONCLUSION

The case study reveals that the FirstRand group has committed itself to an agenda on responsible financing as a platform to allow the corporate to get involved in the low carbon and green economy both in South Africa and beyond. FirstRand continually measures and estimates the group's carbon footprint. The group is also committed to assist its valued customers in the effective use of its products and services with the view to assisting them in improving behaviour and performance that could lead to an effective engagement with the low carbon and greener economy. FirstRand has a department established and dedicated for environmental risk management, within which specialists on climate change comment regularly on regulations, legislation, and ensure that the carbon reduction programme internally is maintained and managed. The group's carbon footprint is disclosed and verified externally on an annual basis through the CDP Report South Africa. An estimated 90 per cent of carbon emissions for the group are linked directly to energy consumption. This has resulted in FirstRand linking carbon reduction to the energy management strategy.

A focus has been placed internally on the role of a financial institution in the achievement of a green economy. FirstRand recognises the importance of its role in achieving many of the South African governments' goals related to a greener economy, and has developed service lines to support this in terms of financing renewable energy projects, looking at innovative ways of financing solar water heaters in low and middle income housing. The group has also introduced environmentally related questions into procurement tender documents. The questions assist in evaluating awareness of suppliers to quickly assess environmental impact of their goods and services.

In terms of a sustainable impact and transition process, the FirstRand group has implemented environmental and social reviews on all business related loans within the divisions of Rand Merchant Bank, FNB, and WesBank. This process engages clients on their environmental and social compliance performance in relation to their businesses and requests information in relation to environmental performance. FirstRand is the only South African financial institution to extend this beyond its strictly defined project financing activities into all business related financing activities. The group's investment banking division, Rand Merchant Bank, has a dedicated team focussed on financing renewable energy projects, assisting clients in submitting tenders for the REFIT process. FirstRand looks forward to establishing strategic partnerships on programmes such as the low income modular housing programmes to assist in a move to a greener economy for all income levels in South Africa.

NOTES AND REFERENCES

- 1 FirstRand., 2011. Building on energy efficiency. Johannesburg: National Business Initiative.
- 2 Bisang, O., 2000. Green banking – the value of ISO 14001 certification in the financial sector. ISO 9000 and ISO 14001 News 4/2000. pp. 7–11.
- 3 CDP (Carbon disclosure Project)., 2012. CDP Supply Chain Report 2012: A New Era: Supplier Management in the Low-Carbon Economy. London: CDP.
- 4 Nhamo, G. and Bimha, A., 2011. Multilateral Development Banks in Carbon and Climate financing. In Godwell Nhamo, Green Economy and climate Mitigation: Topics of Relevance to Africa. Pretoria: Africa Institute of South Africa.
- 5 ADB (Asian Development Bank)., 2011. Environment Program: Greening Growth in Asia and the Pacific. Manila: ADB.
- 6 Furrer, B. Hoffmann, V. and Swoboda, M., 2009. Banking & climate change: Opportunities and risks: An analysis of climate strategies in more than 100 banks worldwide. Zurich: Zurich University.
- 7 Ibid. p. 17.
- 8 Ibid.
- 9 Ibid. p. 18.
- 10 Sukhdev, P., 2012. Nature is the source of much value to us every day, and yet it mostly bypasses markets, escapes pricing, and defies valuation. *Development Asia*, January-March 2012, pp. 22–23.
- 11 A detailed account of the four groups can be found from Furrer, B., Hoffmann, V., and Swoboda, M., 2009. Banking & Climate Change: Opportunities and Risks: An Analysis of Climate Strategies in more than 100 banks worldwide. Zurich: Zurich University. pp. 35–40.
- 12 Setijawan, E., 2010. Environment, climate change and low carbon development. Available at <http://www.bi.go.id/NR/rdonlyres/E128B84E-FEB3-4412-B30F-99C2A23618F2/24580/ESGreenBankingclimatechange.pdf> [Accessed 17 February 2012].
- 13 Dash, R. N, 2008. Sustainable 'Green' Banking: The Story of Triodos Bank. CAB Calling: October–December 2008.
- 14 UCB (United Comercial Bank Ltd)., 2011. Green Banking Policy. Chittagong: UCB. p. 4.
- 15 Ibid.
- 16 Ibid. pp. 2–3.
- 17 Ibid.
- 18 Vassiliou, K., 2011. Green banking: Opportunities and obstacles. Available at http://www.renewablesb2b.com/data/shared/Eurobank_EFG_Presentation.pdf [Accessed 17 February 2012].
- 19 Setijawan, E., 2010. Environment, climate change and low carbon development. Available at <http://www.bi.go.id/NR/rdonlyres/E128B84E-FEB3-4412-B30F-99C2A23618F2/24580/ESGreenBankingclimatechange.pdf> [Accessed 17 February 2012].
- 20 Vassiliou, K., 2011. Op Cit.
- 21 Setijawan, E., 2010. Op Cit.
- 22 UNEP FI (United Nations Environment Programme Finance Initiative)., 2007. Green financial products and services: Current state of play and future opportunities. Nairobi: ENEP FI.
- 23 Ibid.
- 24 UNEP FI., 2006. Adaptation and Vulnerability to Climate Change: The Role of the Finance Sector. Nairobi: ENEP FI.

- 25 Ibid.
- 26 Ibid. p. 12.
- 27 Ibid.
- 28 IBF (Irish Banking Federation), 2009. IBF Climate change Principles for the Financial Sector. Dublin: IBF. pp. 1–2.
- 29 Green For All Publications., 2010. Where to get the green: Sources of Funds for Green Entrepreneurs. Washington DC: Green For all Publications.
- 30 National Planning Commission., 2011. National Development Plan: Vision for 2030. Pretoria: National Planning Commission.
- 31 Nhamo, G., 2009. Climate Change: Double Edged Sword for African Trade and Development. *International Journal of African Renaissance*, 4(2), pp. 117–139.
- 32 FirstRand., 2010. FirstRand Environment Programme. Available at <http://www.firststrandsustain.co.za/group-environmental-programme> [Accessed 25 April 2011].
- 33 Authors based on FirstRand., 2010.
- 34 FirstRand., 2010. Climate Change Statement. Johannesburg: FirstRand group.
- 35 Ibid.
- 36 Ibid.
- 37 FirstRand., 2010. FirstRand Environment Programme. Available at <http://www.firststrandsustain.co.za/group-environmental-programme> [Accessed 25 April 2011].
- 38 Ibid.
- 39 Ibid.
- 40 First National Bank., 2010. FNB Report to Society 2010. Johannesburg: FNB.
- 41 Ibid.
- 42 Picture supplied by FirstRand.
- 43 NBI (National Business Initiative), 2010. Carbon Disclosure Project 2010 South Africa JSE 100. Johannesburg: NBI & Incite Sustainability.
- 44 Ibid.
- 45 WesBank., 2011. Fairland energy saving facts. Available at <https://www.wesbank.co.za/WesBankCoZa/about/socialinvestment/fairlandenenergysavingfacts.aspx> [Accessed 31 January 2012].
- 46 Picture supplied by FirstRand.

Nedbank and the transition to low carbon operations

Alfred Bimha

ABSTRACT

The Nedbank group is a trend setter in addressing climate change in the banking sector, both nationally and across Africa. With its strategy of reducing before off-setting, a carbon neutral status has been achieved as a result of 20 years of environmental programmes put in place by the group. The success has been mainly driven by putting up a group wide structure and policies that ensure the embedding of climate change programmes into everyday work operations. Nedbank's emphasis has been on internal behavioural change in terms of reducing water, electricity, and paper usage; further reducing waste from operations, business travel by air, and rented business cars, which would ultimately reduce their carbon emissions. Behavioural change is indicated by the tCO₂e/FTE (carbon emissions per full time employee) that has been steadily decreasing since 2007 when the first carbon footprint exercise was initiated by the bank. As of 2007 the carbon emissions per full time employee was 9.15 tCO₂e/FTE¹ compared to the 2010 measure of 8.25 tCO₂e/FTE, which also translated to a financial saving of R36 million.

INTRODUCTION

Nedbank is recognised as a leading pioneer in the financial and corporate sector in South Africa in terms of incorporating climate change initiatives that result in low carbon in its business operations. A number of international and national accolades² have been awarded to the bank with regards to championing sustainability and climate change.³ In addition, Nedbank is one of the five South African Companies in Africa⁴ who are listed on the Dow Jones Sustainability Index, and dynamically involved in climate change adaptation and mitigation issues through its various corporate programmes and activities. The Nedbank group believes that carbon finance is crucial in the mitigation of risks that come

along with the adverse climate change. Furthermore, Nedbank alludes to the notion that carbon finance will ensure the success of strategies designed to promulgate the evolution and implementation of environmentally oriented business practice, which in turn will ensure long term sustainability.⁵

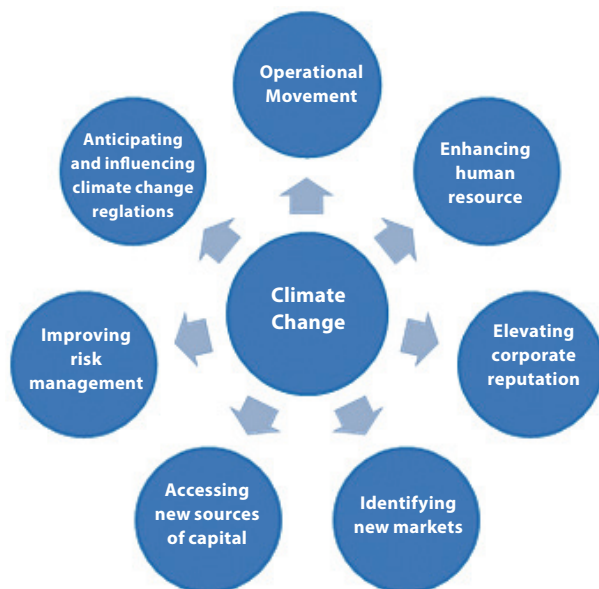
The Nedbank group is the fourth largest in the South African banking sector going by asset size, and second largest in terms of retail deposit base, and as a bank holding company, Nedbank Limited is its principal banking subsidiary. The group offers wholesale and retail banking services, insurance, asset management, and wealth management on a wider basis. These are offered through five main business clusters which are: Nedbank Capital, Nedbank Corporate, Nedbank Business Banking, Nedbank Retail, and Nedbank Wealth. As of 2010 the Nedbank group employed 27 525 people and made an operating profit of R23,6 billion against total operating expenses of R16,45 billion.⁶

In its climate change position statement,⁷ Nedbank states that its major goal is to engage in initiatives and activities that support a global transition from carbon intensive activities to more efficient low carbon alternatives. Within this position statement, it is clearly spelt out that climate change poses future risks in the investments of the company and thus, there is a need to engage customers in mitigating these risks. The major issues addressed in the climate change position encompass issues involving the advancement of climate change policy at national level, transparent reporting of Nedbank carbon emissions activities, continuous improvement of the bank's Transformation and Sustainability Committee, continuous external auditing and verification of the Nedbank group Carbon Management Programme, and lastly, developing innovative financing solutions that will promote low carbon emissions in economic activities.

The aim of this chapter is to bring to light the climate change initiatives at Nedbank as a beacon from where good practice standards of achieving carbon neutrality can be followed by peers and other firms in other industrial sectors of the economy. In this regard an attempt to conceptualise and document the Nedbank group's business case of a transition to low carbon operations will be done.

LOW CARBON OPERATIONS IN THE BANKING SECTOR

Hoffman and Woody⁸ identified three major steps in incorporating climate change adaptation into a firm's business strategy, namely: knowing the company's carbon exposure; taking action to reduce the company's carbon footprint and assessing business opportunities; as well as influencing the policy development process. These over-arching steps, coupled with the generic model, can be seen in use within the business strategies and operations of Nedbank to achieve and maintain the status of being a carbon neutral company. The illustration in Figure 9.1 shows the important factors needed to be taken cognisance of in linking climate change to an institution's business strategy.⁹

Figure 9.1 Linking Business Strategy and Climate ChangeSource: Author¹⁰

Although the banking sector contributes minimally to effects of climate change compared to other industries, indirectly it contributes to the emission of carbon through asset quality of the lending portfolios and investment portfolios which are mostly vested in carbon intensive industries. A couple of studies have been done to ascertain how the banking sector is contributing to low carbon transition. The analysis done range from identifying the banking sector's role in facilitating transition to a low carbon economy to the identification of projects, financial instruments, and scope of quantifying the amounts needed to finance low carbon projects. Some of the studies try to explore how banking institutions are including issues of climate change within the organisational structure, operations, and products.¹¹

One of the studies that highlight the state of affairs in tackling carbon emissions by the banking sector was done by CERES.¹² In this report a survey of the 40 largest banks in the world was done to find out how they were incorporating the issues of climate change into their organisational structure and operations. The most outstanding finding was that of European banks. The banks were embracing climate change issues better than the United States of America (US) banks. The banks from emerging economies, especially Brazil and China, were found to be lagging behind in terms of incorporating climate change issues. This report was promulgated as a benchmarking tool that showcased models of best practice in climate change within the financial sector. This was done by drawing up a Climate Change Governance Checklist in five governance areas to evaluate the selected banks. These include: board oversight, management execution,

public disclosure, greenhouse gas (GHG) emissions accounting, and strategic planning. The general outcomes of the study were as follows:¹³

1. **Board Oversight:** leading banks are making it a fiduciary duty for corporate board directors to address the issue of climate change.
2. **Management Execution:** Senior Executives have more mandates to translate and embed climate change into formal policies and governance programmes.
3. **Internal Greenhouse Gas Management:** Most banks were restructuring or replacing their energy procurement policies to involve more renewable energy sources, and there is a greater emphasis in their real estate management of integrated energy efficient, green architecture principles.
4. **Risk Management and External Financing:** Of the 23 banks surveyed, Equator Principles were used to integrate environmental, social and governance (ESG) factors for investment and development projects in emerging markets. Some leading banks advanced to promulgate climate change specific lending policies and alternative energy investments in their array of banking products and services.
5. **Investment and Retail Products:** Climate change provided an opportunity and innovation for banks to vary their investment and retail product and services. This stemmed from an emergent client concern in climate risk management, carbon offsets, and socially responsible investing.

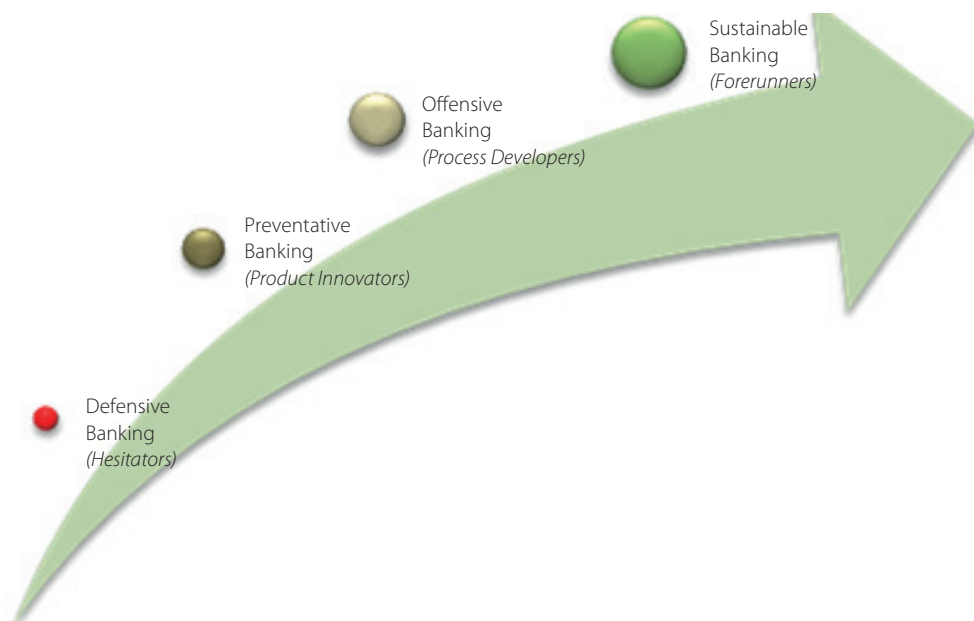
In another study done by Furrer et al,¹⁴ the authors sought to find out from 100 banks worldwide what strategies they were implementing to tackle climate change. They noted that it was difficult for general frameworks to describe corporate climate strategies that are being used in the banking sector. The general frameworks tend to focus more on the basic industries and their dependency on fossil fuels and exploring the effects of extreme weather events and regulation on corporations. However, the banking sector is widely exposed to weather adversities through the business linkages it has with its customers. They further assert that the banking sector's impact on climate change is indirect through its asset quality of lending and investment portfolios.

In this study, the authors formulated a comprehensive and scientifically well-founded framework for climate strategy in the banking sector. Using this framework they managed to rank current climate activities and best current practices based on the banks' responses to a drawn up questionnaire. The conceptual framework, which was developed, consists of the dimensions of operations (covering climate mitigation and offsetting), business (specialised products and services as well as integration into core business), and governance that focused on data management, intellectual capital as well as disclosure, engagement, and leadership. Using the questionnaire based on this framework the authors were able to come up with a benchmark to score the banks and cluster them by identifying the types of climate strategies they were pursuing. Four categories emerged

that included hesitators (48,2 per cent of sampled banks), product innovators (20,2 per cent), process developers (26,3 per cent), and forerunners (5,3 per cent).

Juecken and Bouma¹⁵ illustrate a path a bank takes in achieving sustainability or low carbon operations (Figure 9.2). The trajectory they postulate mirrors the characteristics of the clusters that Furrer et al¹⁶ used in their study as discussed earlier.

Figure 9.2 Growth Path to Low Carbon Operations by Banks



Source: Author

According to Juecken and Bouma, under defensive banking a bank is inactive, attempting to delay or contest new environmental legislation.¹⁷ Also, chances for cost saving initiatives through energy efficient programmes and systems are not done and environmental management is seen as an avoidable cost. Furrer et al call this stage of defensive banking *hesitators* and they also allude that banks at this stage will not be engaging in any climate change activities and they do not consider them important.¹⁸

With preventative banking, possible environmental cost saving initiatives and eco-efficiencies are keenly taken up by banks. This is necessitated by government and NGOs who directly and indirectly put restrictions on the banking activities through proposed legislation, lobbying, through social pressure or jurisprudence. There is also integration of potential revenues, costs and risks into daily banking operations, and internal operations and processes such as environmental management are only considered at this stage. Furrer et al call this stage of preventative banking, *product innovators*, where banks develop specialised climate change products and react quickly to the rising demand for

climate change lending and investment products. However, they consent that climate change activities have not been mainstreamed into the banks' operations at this stage.

Offensive banking considers external activities with regards to combating climate change in addition to internal activities. More so, the development and marketing of environmentally friendly products are intensified at this stage. Furthermore at this stage, banking institutions will regularly report on their environmental management activities and also continuously look for win-win solutions. Nevertheless, at this stage negative environmental costs are not completely integrated into the pricing systems and win-win solutions will not lead to sustainability in their operations. Furrer et al,¹⁹ consider this stage to be that of *process developers*, where a solid management framework is in place; a climate change statement position is established; company-wide plans are developed and their implementation is detailed; and top management is assigned to direct climate change issues within the organisation.

Furrer et al further show that at this stage banks externally communicate on climate change issues; actively participate in investor coalitions to promote integration of climate change related risks and opportunities in banking business activities; discuss climate change topics with investors, clients and suppliers; issue public statements on climate change at high level speaking venues; contribute to international and national debates on climate change related economic impacts; embark on marketing campaigns on their climate change efforts and contribute to community projects that foster climate change mitigation and adaptation. They concede, however, that data and risk management for climate change will still be weak and estimation of financial impacts of climate change is not well pronounced at this stage.

Sustainable banking is considered by Juecken and Bouma²⁰ as a concept which defines the state of corporate philosophy favouring projects at a higher risk, lower return, and longer payback periods. The highest sustainable rates of returns, which are profitable in the long run, are preferred over highest financial rates of return at this stage. More so, banks require that shareholders have the same vision and ambition in terms of sustainability. This stage is called, *forerunners* by Furrer et al where climate change has been integrated into business processes and climate change activities are broad and include all elements of climate strategies along the entire value chain. Furrer et al also purport that at this stage/level there is an establishment of extensive climate governance by banks which includes: management framework, intellectual capital, disclosure, engagement, leadership, risk, and data management.²¹ However, many banks at this stage face difficulties with availability and the quality of climate change-related data, which is valuable for factoring climate change into risk, pricing, and valuation models.

In a report done to document sustainable banking in Africa, de Cleene and Wood²² identified the following as drivers for sustainable banking in Africa: regulatory developments, expansion of corporate governance codes, globalisation and competitive advantage, stakeholder pressure and reputational risks, credit risk, and social pressures. The authors identified the current practices of sustainability banking in the African context

as hovering around four areas which are: pricing assets and exercising ownership, providing new finance, risk management, and savings and transactions. Within the South African context, four areas were identified, and the details around these four areas are summarised in Table 9.1.

Table 9.1 Practices of sustainable banking in South Africa

Pricing Assets and Exercising Ownership	Providing New Finance	Risk Management	Savings and Transactions
- Financial Sector Charter – a voluntary programme by the Financial Institutions to encourage black economic empowerment (BEE) and invest in previously disadvantaged sectors of the society - The offering of products that provide environmental protection and conservation - Retirement funds extending their corporate governance to include engagement on environmental and social performance - International trade in carbon credits - The Johannesburg stock exchange launch of a Socially Responsible Investing (SRI) Index	- Finmark Trust established to improve the profile of the unbanked sector in South Africa - The National Housing Finance Corporation bridging the credit gap by underwriting and funding private retail lenders with housing finance and alternative tenure programmes - The increase in disclosure of sustainability and governance performance by South African Banks - Public Private Partnerships being used to finance government infrastructure and ensure more sustainable ventures - Khula Enterprise Financing mentorship scheme for SMME to develop business skills in this sector	- The big four banks in South Africa have produced sustainability reports, and all investigate and manage/ environmental/ social risk to some degree. - The publication of the King Report on Corporate Governance for South Africa (King II), which advocated a shift from the single to the triple bottom line reporting. Triple bottom reporting involves the divulging of business information pertaining to its economic, environmental, and social aspects of its activities. - Adoption of Equator Principles which foster the financing of economic and socially friendly investment projects. - The consideration of HIV/AIDS and its impact on the workforce/ labour which is a critical factor in national economic prosperity	- The partnership between the Big Four Banks and the government (the Inter-Banks Task Groups – IBTG) was initiated in 2003 to develop a low cost transaction account to cater for the unbanked market. - The facilitation by IBTG of point to point transmission of funds without the need for a bank account or formal banking relationship. - Improvement in real access to cash by installing ATMs countrywide by a nonbank account. - The growth in mobile phone technology has become an important additional channel for banks.

Source: Author²³

RATIONALE FOR A LOW CARBON NEDBANK

To move towards a low carbon and carbon neutral bank, Nedbank embarked on an approach to 'reduce before offsetting'. In this regard, the bank identified behavioural (employee behaviour) change, carbon reduction targets (through reducing paper, water, electricity, travel, and waste) and operational efficiencies as the main drivers. After carbon reduction initiatives had been achieved the bank opted for offsetting using carbon credits. Nedbank has a remarkable track record of 20 years in achieving environmental sustainability and addressing climate change. This has broadened the commitment to realise its vision of attaining a leadership position in sustainability, both in financial services and in general, through a fair and integrated approach to address environmental, social, cultural, and economic sustainability issues. The bank regards climate change as an urgent issue requiring widespread action from the government, business, and citizens in order to maintain global prosperity, standard of living, and security. Authorities at Nedbank acknowledge the risks and opportunities posed by climate change to all parts of the business sector. In this regard, Nedbank considers playing their part in increasing energy efficiency and reducing carbon emissions into the atmosphere as a necessary endeavour.²⁴

Of prime importance is the recognition by Nedbank of how banking institutions have a crucial role to play in enabling societal transition from a carbon-intensive economy to more efficient low carbon alternatives. Thus, Nedbank intends leading by making climate change a core issue directly in their operations and through their business investments. Nedbank also takes cognisance of the continuous future risks posed by climate change on their investments and there is constant engagement with its clients in mitigating these risks.

Nedbank has partnered with the World Wild Fund for Nature – South Africa (WWF-SA) to achieve credible and sustainable carbon neutrality. This partnership has created a credible foundation which will assist the Nedbank group in creating and delivering client value premixed with the aspect of carbon neutrality among its stakeholders. Some of the stakeholders identified in the strategy to create synergy with them on 'green issues' are briefly presented in Table 9.2 below.²⁵

Table 9.2 Nedbank's Stakeholders on Climate Change Issues

Stakeholder	Strategies of Synergy on the Climate change Issue
Government	Nedbank will continue to support government, wherever possible, in leveraging the opportunities presented by the growing 'green' economy to address some of the environmental and social challenges facing South Africa.
Clients	The Nedbank group is in a good position to enhance its client value proposition through the provision of 'green' financial products and services.
Suppliers and partners	Through collaboration with suppliers and business partners the group is looking forward to helping move South Africa's financial services industry, and the country's economy as a whole, towards a low-carbon future.

Stakeholder	Strategies of Synergy on the Climate change Issue
Staff	The group's aim is to continue reducing its own direct carbon footprint in partnership with its employees. Intensity reduction targets remain in place and are incorporated in performance assessments, as does a focus on promoting environmental awareness and action among staff members.
Investors	As environmental regulation increasingly drives the SA economy, 'green' companies and technologies are set to become key contributors to sustainable investment success. Carbon neutrality positions the Nedbank group at the crest of this investment wave.

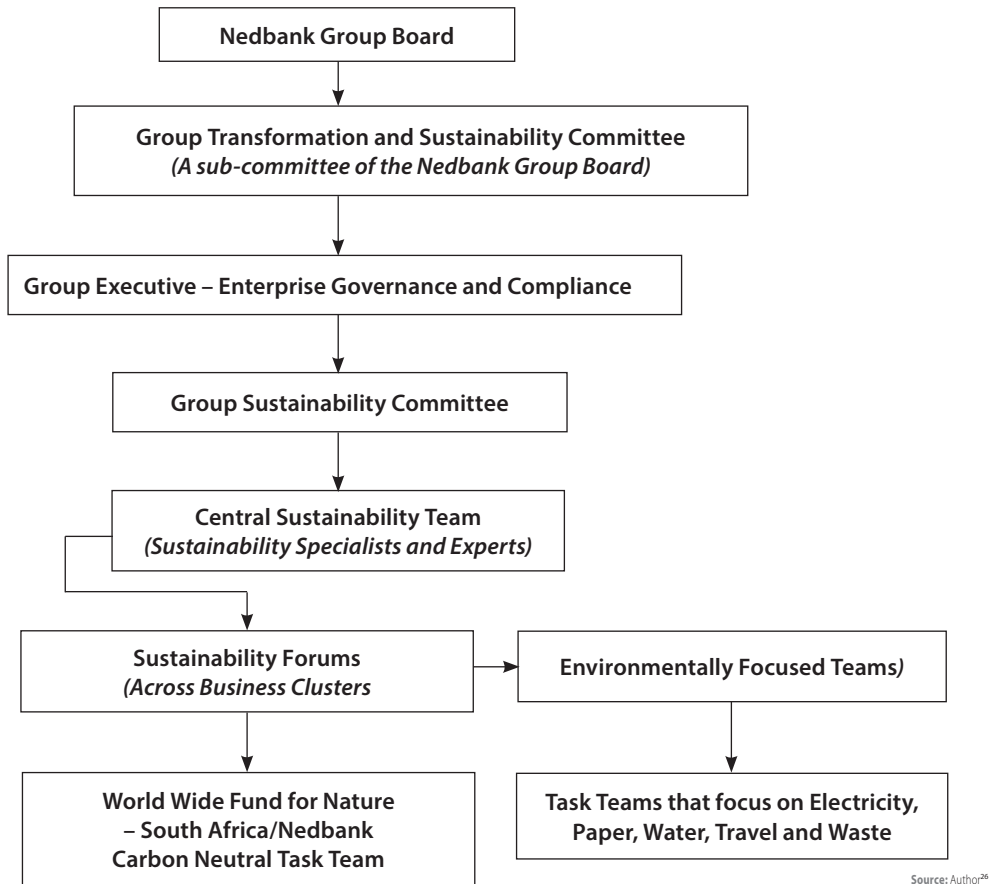
Source: Author

NEDBANK’S ENABLERS FOR THE LOW CARBON AND GREEN ECONOMY

The broad carbon emissions reduction strategy is simply achieved through implementing behavioural change of personnel, instituting efficiency in banking operations, and offsetting residual carbon emissions through the purchase of carbon credits. The group has courted the expertise of the environmental conservationist organisation such as WWF-SA, in crafting a successful strategy and programme to achieve the carbon neutrality status, and this has been ongoing for the past 20 years. A number of pillars were put in place that enabled the bank to move swiftly and smoothly towards a low carbon and greener economy. These are discussed in more depth in the paragraphs below.

SUSTAINABILITY ORGANISATIONAL STRUCTURE

In order to ensure that behavioural change, in terms of being sustainable in the bank’s operations, would permeate through the company, a strong organisational structure was crafted. At the strategic level a Group Transformation and Sustainability Committee (a sub-committee of Nedbank Group Board) is in place (Figure 9.3). The sole purpose of this committee is ensuring that all environmental policies are embedded into the Nedbank group philosophy and practice. A group executive, who is at the executive management level, is tasked with enterprise governance and compliance and assumes overall accountability for the management of environmental sustainability. Furthermore, a Group Sustainability Committee (GSC) is available, with increased executive management level representation. At an operational level, a central sustainability team exists, which constitutes sustainability specialists and experts in environmental law, sustainability, and stakeholder engagement. This team supports the GSC in its pursuit to drive environmental sustainability across the Nedbank group.

Figure 9.3: Nedbank Sustainability Organisational Structure

FORMULATED AND IMPLEMENTED ORGANISATIONAL ENVIRONMENTAL POLICIES

Since the Nedbank group is predominantly a banking institution, it was appropriate for them to align themselves to carbon reduction voluntary programmes that are in sync with their operations. In this regard, their environmental policy is aligned to the expected government environmental protection objectives. More so, there is continuous assurance process of complying with environmental legislation and regulations. This was put in place to ensure that this is their own Social and Environmental Management System (SEMS) which is build on the framework of ISO14001. SEMS widely outlines the process involved in appraising the environmental and social risks in the investments or lending activities to be undertaken within the Group. The Group's climate change position statement follows the banking climate policy standards set by leading global banks and it outlines clear and comprehensive targets for the reduction in usage of essential

natural resources.²⁷ These targets have been used in group-wide performance scorecard measurements.

STAFF COMMUNICATION, TRAINING, AND ENGAGEMENT IN ENVIRONMENT SUSTAINABILITY

With sustainability strategy, structures and policies in place it will be necessary to ensure that the employees are adequately made aware, educated, and engaged with the resources and modalities that have been put in place in order to make the carbon neutrality achievable. To this end, the following initiatives were put in place by Nedbank:²⁸

- **A 'Green' intranet site** – an internal website is available to staff and gives essential information. The information is advisory in nature and some of it is in the form of guidelines for incorporating 'green' principles or climate friendly activities into the employees' work and home.
- **Deep Green Day** – this is an annual day where employees nationally engage in a range of 'green' initiatives which include tree planting, recycling, and community sustainability projects.
- **Group-wide email communications** – There is constant use of communication (especially regular email updates) to keep staff members informed, particularly in terms of efforts to achieve carbon reduction targets.
- **3sixty** – This is an internal hard print staff magazine with a variety of articles on environmental management issues.
- **Employee advocacy** – a planned 'green' advocacy programme for 2010 was not fully implemented, however this was completed through the 'green' internet and intranet sites.
- **Staff road shows** – In order to raise awareness of the process of greening the Group's operations and products the Chief Executive, Mike Brown, in 2010 conducted a series of staff road shows. These presentations focused on updating staff on the Nedbank group's 'green' credentials. Employees were encouraged to increase their involvement in driving environmental sustainability in their areas of influence.
- **Sustainability Resource** – A shared portal has been created within the institution and this contains training material, climate change research and data, water and social sustainability information, climate change legislation and policies, international best practice with regards to climate change and related issues, and environmental risk, as well as tools such as SEMS and screening and assessment methods. The aim of the portal is to provide group-wide access to important sustainability information which will enhance decision making and achieving the laid out 'greening' strategy in the climate change policy statement.
- **Super Sustainability Forum** – This is a regular and promoted tele-conferencing initiative whose aim is to reduce carbon emission through travel intended

for face to face meetings for all employees outside of the Sandton Head Office Communication sessions. These are aimed at personal assistants and administration staff, as well as selected influential staff members, through their wide sphere of influence within the Group, to catalyse change in the environmental mindsets of fellow employees and clients. These sessions provide crucial and practical corporate insights in environmental sustainability initiatives and their implications for the business.

- **In order to verify that** their employees are participating fully in the environmental initiatives a group enumerative checking exercise was done in 2010.²⁹ The results of the exercise indicated that 84% of employees completed the Environmental Policy acknowledgement; 85% of employees completed the Corporate Responsibility Policy acknowledgement; and 65% of employees completed the commuting and awareness survey. These statistics show a high level of participation and commitment of individual staff to overall sustainability and green issues. This is indicated by an increase of staff participation in the company's sustainability issues from 74% in 2009 to 95% in 2010.³⁰ The Nedbank group also confirmed that more than 88% of staff surveyed believed that the Nedbank group has assisted them in reducing their own environmental footprint. A total of 4 804 Nedbank group employees completed the online sustainability training in 2010.³¹

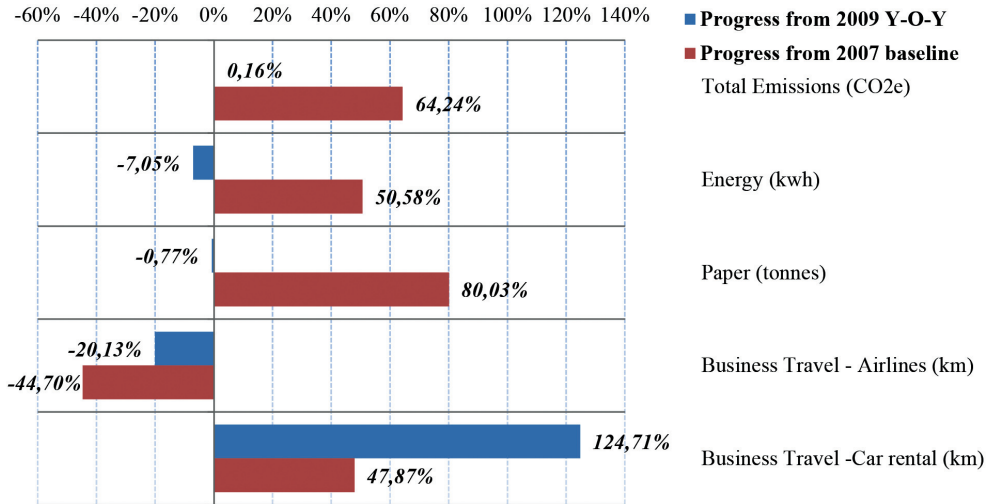
Nedbank has four major areas of sustainability governance which are economic, environmental, social, and cultural. Policies and structures have been set to ensure that the group achieves sustainability on these four fronts. However, for the purposes of this study we will consider the environmental focus area. Table 9.3 contains a summary tabulation of Nedbank's structure and policies that focuses on the sustainability of the environment that has been put in place to be used in transitioning to low carbon operations.

Table 9.3 Summary of Nedbank's Structure and Policies of Environmental Sustainability

<i>Sustain ability focus areas</i>	<i>Nedbank group strategic focus, Deep Green aspirations, and material issues</i>	<i>Relevant risks</i>	<i>Board and executive committee risk management committees</i>	<i>Policies and forums</i>	<i>Guiding principles</i>
Environ- mental	Strategic focus - Lead as a green and caring bank; Deep Green aspirations - Highly involved in the community and environment; Key material issue -Minimise usage of, and impact on, natural resources.	• Reputational risk; • Social and environmental risk; • Strategic risk.	• Group Transformation and Sustainability Committee.	• Environmental Policy supported by the Social and Environmental Management System.	• UN Global Compact • Equator Principles; • Sector Guidelines; • Screening Tool; • King III.

BEHAVIOURAL CHANGE: A PANACEA TO LOW CARBON OPERATIONS TRANSITION

Having realised that behavioural change played a major part in enabling Nedbank group attain carbon neutrality, it is possible to deduce from a qualitative and quantitative basis which of the carbon reduction initiatives led to a big contribution in emission reductions for the Group, and per FTE (Full Time Employment). During 2010, the Nedbank group spent R54,6 million, compared to R31,3 million spent in 2009, on environmental initiatives. The increase in expenditure indicates how crucial environmental issues are to the Nedbank group's operations. It is important also to indicate that this expenditure was incurred across all business areas of the Group, including Nedbank Retail, Nedbank Capital, and Nedbank Property Finance. There were significant increases in spending in Nedbank Property Services, Enterprise Governance and Compliance (EGC), Group Technology, Group Marketing and Communications, and The Green Trust.³² These units incurred such huge expenses as they were deemed strategic in terms of fulfilling the carbon neutrality strategy. As can be observed from Figure 9.4, there has been a constant check on the increase of total emissions year-on-year (0.16 per cent from 2009 to 2010), signalling the success of the internal behavioural changes being implemented by Nedbank.

Figure 9.4 Performance of Carbon Reduction Initiatives against set targetsSource: Author³³

The Nedbank group overall reported GHG emissions in absolute terms increased by 0.16 per cent year on year from 213 081 tCO₂e in 2009 to 213 428 tCO₂e to date, as can be seen in Figure 9.4 above. However, Nedbank group's emissions per full time employee were reduced year on year by 6 per cent to 8.25 tCO₂e per annum.³⁴ The reason the Group emphasises on measuring the carbon emissions reduction based on FTE is to track behavioural change from a quantitative aspect backed by qualitative aspects we discussed earlier in the Nedbank's Enablers section. The behavioural change is measured on five aspects: energy usage, water usage, paper usage, waste generated, and business travel. These are indicated as the main areas from which their carbon emissions are produced and we analyse and comment briefly on each of the areas below.

Energy is the largest contributor of the Group's carbon emissions, constituting 77 per cent. As a result, in 2010 efforts were intensified to reduce energy usage wherever possible. Initiatives included the installation of motion sensors, heat pumps, block out blinds, and the upgrading of numerous building management systems at an initial capital outlay of approximately R6,6 million. After implementing these energy usage reduction technologies, there was a reduction in electricity usage by 13 per cent per FTE from 6,707kwh/FTE (2009) to 5,849 kwh/FTE (2010) and usage of the combined workforce for the group by 7,05 per cent from 162,87 million kwh in 2009 to 151,39 million kwh in 2010.³⁵

The Group's first set water intensity reduction target of 5 per cent by 2010 from 2005 levels was achieved at the end of 2009, thus creating a new target of 10 per cent for 2011. A couple of initiatives further contributed to a significant reduction in water consumption by 5 per cent for 2010 against the new target. Some of the initiatives introduced included the installation of waterless urinals and dual-flush toilets, the collection of rainwater and recycled water. These initiatives are expected to have a positive impact in the years to

come. The most noteworthy behavioural change initiative under this area has been the discouragement of using bottled water at all Nedbank group offices and branches, and employees are mandated to use glass jugs that are refillable at filtered water points. This process of raising awareness of the carbon-intensive process of bottling and transporting bottled water is intended for employees to eventually desist procuring bottled water for their personal and home use as well. It will be beneficial to have an appropriate measure of the impact of this behavioural change.³⁶

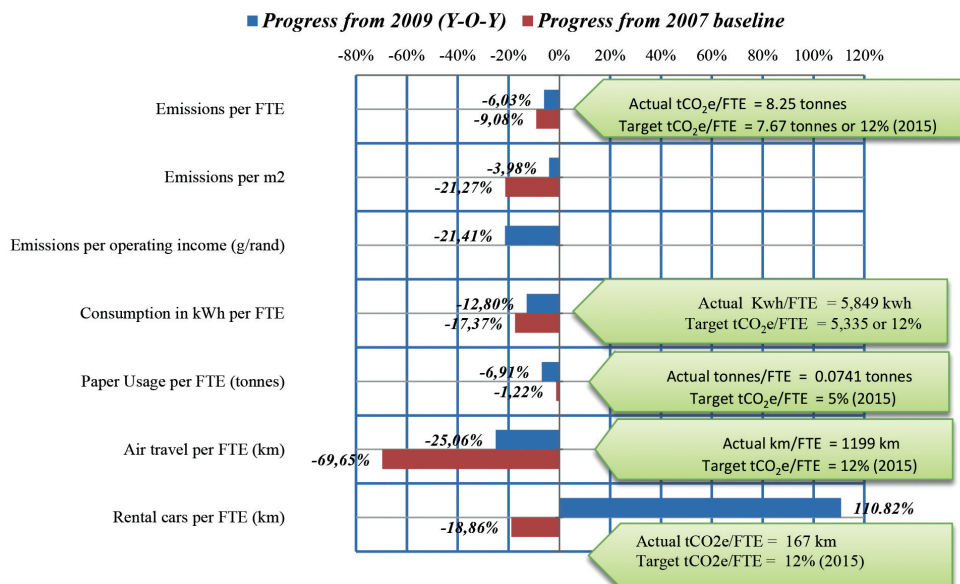
The original paper intensity reduction target was 10 per cent per FTE from 2007 levels. However, it proved difficult to attain this. Failure to achieve this target was due to inaccurate calculations of the original base, thus affecting previous reporting periods. Furthermore, the inclusion of Imperial Bank, growing regulatory requirements and legacy systems contributed to increased paper usage. Regardless of these setbacks, a 1,2 per cent decrease per FTE from 2007 levels was realised. However, the solace is in that paper use accounts for 2 per cent of Nedbank group's overall carbon emissions. Paper recycled at Nedbank's campus sites amounted to 342,74 tonnes. However, overall there was a slight reduction in usage from 1 932,22 tonnes in 2009 to 1 917,29 tonnes in 2010. New technology introduced in 2011 is expected to reduce paper consumption in Nedbank branches, as well as the following initiatives:³⁷

- Double-sided printing of home loans statements - saved over 400 000 sheets of paper in the final quarter.
- Nedbank has embarked on a major roll out of electronic statements (eStatements) for Nedbank retail card and transactional products. Immediate future plans are to extend the use of eStatements on home loans, personal loans, investment products, and asset finance. To date 155 000 clients have been registered on eStatements, resulting in a paper cost reduction of over R400 000 annually.
- Nedbank has put a function on the ATM which allows clients a choice to print a receipt or view it onscreen.
- All account application processes have been streamlined to ensure that paperwork is radically reduced and online applications are highly encouraged. A target of 10% intensity reduction in waste generation was set, based on 2009 figures and a 5% yearly reduction was also set for 2010 and 2011. A 5% increase of recycled matter was targeted by the end of 2011, with 2009 being the base year. This target, however, was achieved at the end of 2010 and the new target for the end of 2011 was a 3% increase based on 2010 levels. The only concern is how these targets are arrived at in light of the growth in business which also justifies the need to increase the use of more paper. In Nedbank's case recycling is advocated more than using virgin paper in their operations.

The establishment of a business travel policy with updated guidelines on 'green' travel has been useful in ensuring that the institution achieves carbon reduction in this area. The travel

policy advocates the need to use business travel wisely and improve travel behaviour by insisting on the use of video conferencing. This has also necessitated the improvement of video-conferencing facilities at major campus sites. This has contributed to a remarkable carbon reduction by 20,13 per cent of business travel by air overall for the group (see Figure 9.4) and 25,06 per cent for the FTE/km for the group (see Figure 9.5 below). Reducing rental of cars has not been that good on a year to year basis overall for the group as shown in Figure 9.5 below, but in terms of FTE per km as shown in Figure 9.5, there has been remarkable progress. The solace, however, lies in that business travel does not contribute a large chunk of emission for Nedbank, though there is need to put closer scrutiny on this source of emissions. This also presents a dilemma in terms of the financial services industry's need for such resources to fulfil total service which is consummated by face to face delivery which in this case, necessitates an increase in the use of cars. A suggestion will be to hire low carbon emission cars for their business travels.

Figure 9.5 Performance Targets and Progress on Carbon Reduction per Full Time Employment

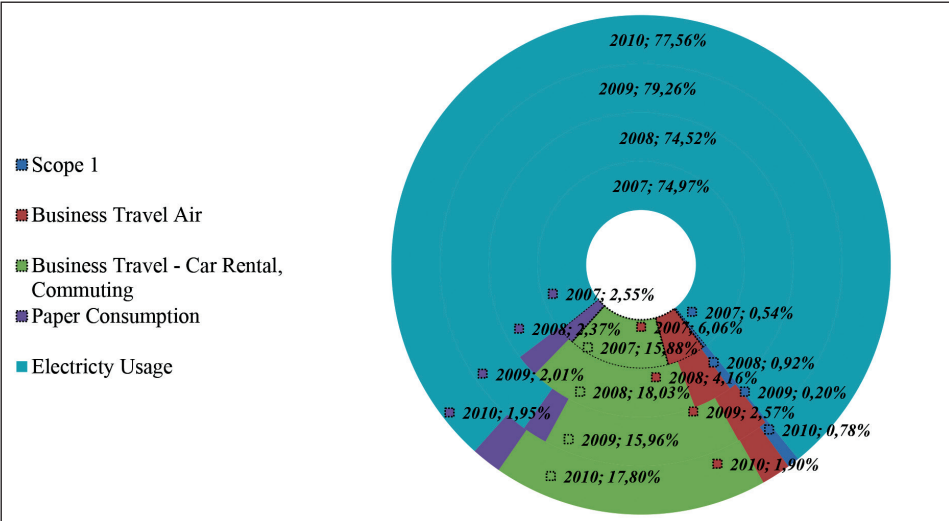


Source: Author²⁸

In order to achieve carbon neutrality through the initiatives highlighted above, Nedbank group has set targets to be achieved by 2015. In Figure 9.5 we show the progress being made by Nedbank in achieving these targets. From Figure 9.4 it can be observed that the banking group has been effective in reducing carbon emissions through reducing air- travel mileage which resulted in a reduction of 20,13 per cent year on year and 44,70 per cent from the base year 2007; however, this initiative contributes about 2 per cent of carbon emissions

(See Figure 9.6). This is also evident as shown in Figure 9.5 above, which shows that this has been a remarkable initiative in decreasing the company's carbon footprint per FTE.

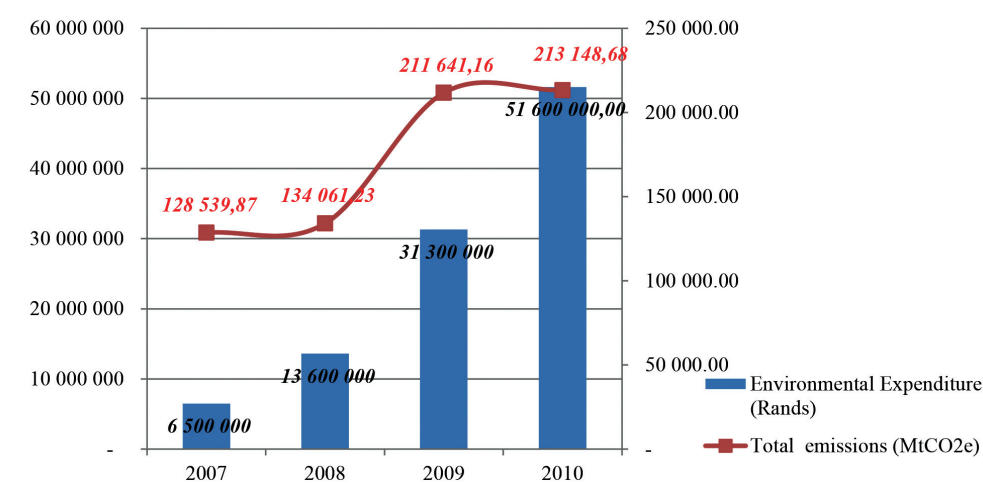
Figure 9.6 Sources of Carbon Emission for Nedbank



Source: Author³⁹

In Figure 9.7 it can be observed that as more funds are dedicated to making the firm more adaptable to climate change, the more progress is made in reducing its emissions and moving to more sustainable operations that reduce costs and increase operational profit. For instance, between 2008 and 2009 there is a huge increase in both carbon emissions produced and the expenses towards reducing them. However, between 2009 and 2010 a point is reached in terms of more environmental expenditure being infused into the bank's operations, resulting in less carbon emissions being produced.

Figure 9.7 Environmental Expenditures compared to Carbon Emissions



It can also be observed in Table 9.4, that Nedbank stands head and shoulders above its peers in being the leader in achieving and promoting carbon neutrality. This is confirmed by the carbon disclosure report of 2010 and 2011 and the following outcomes of the report show how Nedbank has performed better than its peers.

Table 9.4 Nedbank compared with its peers in the Banking Sector

	Nedbank		Standard Bank		FirstRand		ABSA	
	2011	2010	2011	2010	2011	2010	2011	2010
Performance Band	A-	A	C	B	B	B	B	C
Disclosure Score	96	88	74	74	88	93	74	64
GHG Target in place	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
GHG Emission Verified	Yes	Yes	No	No	Yes	Yes	Underway	Yes
Carbon Disclosure Leadership Index Ranking	3	2	-	17	8	1	-	24

ATTAINING CARBON NEUTRALITY THROUGH EXTERNAL ENGAGEMENTS

There are two substantial external projects that Nedbank has embarked on in a bid to obtain carbon credits that can be used to attain carbon neutrality. Firstly, the Kenyan based Rukinga – Kasigau Corridor Reduced Emissions from Deforestation and Degradation (REDD) project entered into with Wildlife Works Inc. in 2009. This project was the first ever to be issued Voluntary Carbon Units (VCUs) for REDD under the Voluntary Carbon Standard (VCS) in 2011.⁴⁰ The second one is the Kibale National re-forestation project in Uganda managed by Face the Future and the Uganda Wildlife Authority. This project has been registered and has attained a Verified Carbon Standard with approximately 370 000 carbon credits being issued from it as of September 2011. Nedbank entered into a Memorandum of Understanding with Face the Future to procure 50 000 verified credit units for the carbon neutral programme and to promote close environmental collaboration.⁴¹

The two projects that the bank has invested in as indicated earlier⁴² go beyond climate mitigation by improving the well-being of the communities in which the projects are located. This is supported through both projects attaining an additional standard known as CBBS (the Climate, Community, and Biodiversity Standard)⁴³ which evaluates land-based carbon projects to ensure that they generate climate, biodiversity, and sustainable development benefits. The two projects above are being undertaken outside of South Africa by Nedbank to promote environmental sustainability. Other projects within South Africa include the Umdoni Gel Fuel Low Income Housing Project in KwaZulu-Natal, and the Soil and More

Reliance Project in the Western Cape. The Umdoni Gel Fuel Low Income Housing Project in KwaZulu-Natal has a similar dual sustainability focus. The project aims to reduce carbon emissions by providing 4 000 households in the region with energy efficient bio-ethanol gel-burning stoves and seven litres of gel fuel per month. Just as important as the green value of this project, is the potential it has to ensure the safety of communities by preventing devastating fires and the contribution it makes to the economic well-being of the people of Umdoni by saving them a significant amount of money in their energy costs each month. The project, as of 2010, has managed to create 5 535 tCO₂e of credible carbon credits between 2008 and 2010 out of the 464 900 litres of gel fuel distributed.⁴⁴ The Soil and More Reliance Project in Western Cape generates carbon offsets through the restriction of methane emissions by displacing the dumping of organic waste by the anaerobic composting treatment of garden and park waste in Cape Town.

The social, environmental and economic benefits from the project and local use of the compost include: sustainable improvement of soil fertility and increase in water retention capacity of the soil in the Western Cape region; improved crop yields, extension of growing season and reduced requirement for and costs of chemical fertilisers and pesticides; direct employment for the composting project and additional temporary employment during the planned construction of a new production site. This project has managed to create 150 jobs and five new businesses as of 2010. More so, it has managed to reduce over 100 000 MtCO₂e gas escaping into the atmosphere and, therefore, mitigating the impacts caused by climate change. Further to this is that Verified Emission Reductions (VER) credits have been created from this project priced at 8 per VER and 8 000 VER credits were available as of 2010 with 70 000 VER being expected as from 2011.⁴⁵

The Nedbank group has also initiated a strategy to support the 'green' efforts of its clients across all business units through an offer of a range of environmentally focused banking and financial products and services. An example of such a product is the Nedbank Savvy Electronic Account which is a popular transactional banking vehicle for environmentally conscious consumers. It is an electronic current account with a full range of transactional features, and is completely paperless. It is designed in such a way that a percentage of the services charge levied on the account is linked to the Nedbank Green Affinity offering, allowing clients to conserve and contribute to the environment.

Nedbank also launched South Africa's first Green Index,⁴⁶ whose main purpose is to be a benchmark for environmentally conscious investors and to become the industry standard in measuring performance of companies with environmentally sustainable business practices. Objectivity and fairness of the Index is achieved through using the Carbon Disclosure Project (CDP) database and the United Nations (UN) register of Clean Development Mechanism (CDM) projects in South Africa. It can be observed from the two analyses above that the twin strategy of behavioural change and attaining carbon neutrality stand out as breakthroughs or flagships for the Nedbank group in ensuring that the activities of Nedbank are climate friendly both externally and internally, and in some way addressing directly the green economy transition.

PLANNED FUTURE PERSPECTIVES IN A LOW CARBON ECONOMY

By achieving carbon neutrality, Nedbank group intends to continue to explore a range of carbon offset projects in South Africa and Africa, particularly those that include renewable energy, avoiding deforestation, and the promotion of re-forestation and biodiversity conservation. This, coupled with intensified internal initiatives discussed above, will ensure that Nedbank sustains and improves its carbon neutrality. In their brochure for carbon finance and carbon emission management they intend to look closely at the legislation and policies for managing climate change, looking at products that will allow their customers to be compliant with the anticipated legislation and policies.⁴⁷ Nedbank also actively participates in forums that discuss government proposals and policy frameworks towards green economy transition.

CONCLUSION

As a direct result of the reduction targets associated with the achievement of carbon neutrality, the Nedbank group achieved approximately R36 million in operational savings between 2007 and 2010.⁴⁸ This proves that climate change adaptation can also enhance an organisation's financial sustainability. These savings have accorded Nedbank ample cash to keep on 'greening' their operations and hence, become the outstanding bank in South Africa and a leader in promoting environmental sustainability in its sector. From the study done, we can claim that Nedbank group within the South African Banking Sector is a trend setter of sustainable banking in Africa. More so, the rudimentary analysis on the initiatives implemented internally in the company show that carbon emission reduction has been highest on the business travel. This was achieved by acquiring state of the art technology in video and teleconferences which significantly reduced carbon emissions from frequent travelling by air and road.

The creation of carbon credits through the first REDD project ever in Africa can also be hailed as a major breakthrough when looking at external projects that have been embarked on in order to be carbon neutral. It can be deduced from the case of Nedbank that combating climate change requires a combination of changing the behaviour of the firm's employees with regards to climate change, and extending outside the firm's resources to help in mitigating the fauna and flora from which the business gets its profits. The internal and external initiatives in the case of Nedbank are given equal importance, are well benchmarked and are verified by independent and competent environmental auditors. The ultimate point from this case study is that carbon reduction and neutrality cannot be merely achieved through internal initiatives of the firm but by also engaging in resourcing and capacitating programmes that are external to the firm that advance the mitigation and adaptation to climate change. Nedbank has illustrated this well and set a benchmark that can be followed by peers and firms in other industries.

NOTES AND REFERENCES

- 1 Nedbank., 2009. Carbon Footprint Measurement (Greenhouse gas emissions report): An overview of Nedbank Group's carbon emissions in 2009. Available at <http://www.nedbankgroup.co.za/sustainability/GreenhouseReport.asp> [Accessed 18 March 2014].
- 2 Some of Nedbank's sustainability highlights, awards, indices and membership are as follows:
 - Carbon Neutral – Africa's first carbon neutral financial organisation.
 - Dow Jones World Sustainability Index membership – the world's premier performance benchmark for companies in terms of corporate sustainability. Included for the fifth year. One of only 25 banks worldwide and three companies with primary listings in South Africa to be included on the index (only SA Bank). 2010: 78% (2009: 77%).
 - JSE SRI Index – inclusion since 2004.
 - WWF Water Balance Programme – Invested R9 million into South Africa's water security.
 - South African Carbon Disclosure Project Leadership Index – 2011, the group recognised as a leader in the performance category and placed second in the disclosure category.
 - CDP's Water Disclosure Project – 2010 voluntary participant.
 - Global 1000 Sustainable Performance Leaders Index – Ranked 284th (third highest SA company).
 - Financial Times – 2010, Emerging Markets Sustainable Bank of the Year for Middle East & Africa.
 - Equator Principles – first African bank signatory.
 - WWF-SA Conservation Partnership.
 - Ernst & Young Excellence in Sustainability Reporting – award of excellence (2011).
 - Ernst & Young Annual Report Awards – joint first place (2011).
 - Annual Chartered Secretaries Southern Africa (CSSA) and JSE Limited Annual Report Awards – overall winner (2010 Integrated Report).
 - UNEP FI – signatory to official Statement on Climate Change.
 - Signatory to the Cancun Communiqué.
 - Climate Change Leadership Awards – 2010 joint winner Financial Services Sector.
 - Nedbank is the first company in South Africa to be awarded a Green Star 'as built' rating for Phase 2 of its head office complex.
 - 2011 Nkonki Integrated Reporting Awards – Nedbank won the Finance Sector and was placed 2nd overall.
- 3 Nedbank., 2011. Carbon Finance. Available at <https://www.nedbank.co.za/website/uploads/files/NedbankCapitalCarbonBrochure.pdf> [Accessed 20 June 2011].
- 4 Moneyweb., 2012. Five SA companies in Dow Jones Sustainability Index. <http://www.moneyweb.co.za/moneyweb-economic-trends/5-sa-companies-in-dow-jones-sustainability-index?sn=2009%20Detail> [Accessed 18 March 2014].
- 5 Nedbank., 2011. Carbon Finance. Retrieved June 20, 2011.
- 6 Nedbank., 2010. Nedbank Group Intergrated Report 2010.
- 7 Nedbank Group., 2009. The Environment: Nedbank's Climate Change Position Statement, Intensity Reduction Targets and Performance Measures. Nedbank Group. Available at <http://www.nedbankgroup.co.za/sustainabilityEnvironmentClimate.asp> [Accessed 20 June 2011].
- 8 Hoffman, A. J. and Woody, J. G., 2008. Climate Change: What's your business Strategy? Boston, Massachusetts: Harvard Business Press.

- 9 Hoffman, A. J., 2007. September. Climate Change and Business Strategy. (M. Toffel, Ed.) Available at http://www.eoearth.org/article/Business_strategy_and_climate_change [Accessed 21 June 2011].
- 10 Ibid.
- 11 See the following articles for various research being done by banks transcending to low carbon operations. Available at https://infocus.creditsuisse.com/data/_product_documents/_articles/325711/Studie.pdf <http://www.accenture.com/us-en/Pages/insight-carbon-capital-banking-financing-economy.aspx>.
- 12 Ceres is a national coalition of investors, environmental groups and other public interest organisations working with companies to address sustainability challenges such as global climate change. Ceres directs the Investor Network on Climate Risk, a group of more than 60 institutional investors from the U.S. and Europe managing over \$4 trillion in assets.
- 13 Cogan, D. C., 2008. Corporate Governance and Climate Change: Banking Sector. Riskmetrics Group/ CERES. Boston: CERES.
- 14 Furrer, B. Hoffman, V. and Swoboda, M., 2009. Banking and Climate Change: Opportunities and Risk - An Analysis of Climate Strategies in more than 100 banks worldwide. SAM, ETH Zurich and the ZHAW Zurich University of Applied Sciences. WWF Germany.
- 15 Juecken, M. and Bouma, J. J., 2001. Sustainable Banking: The greening of finance. Sheffield, United Kingdom: Greenleaf Publishing Limited.
- 16 Ibid.
- 17 Ibid.
- 18 Furrer, B. et al., 2009. Op Cit.
- 19 Ibid.
- 20 Juecken, M. et al., 2001. Op Cit.
- 21 Furrer, B. et al., 2009. Op Cit.
- 22 De Cleene, S. and Wood, C., 2004. Sustainability Banking in Africa. African Institute of Corporate Citizenship.
- 23 Ibid. pp 22–26.
- 24 Nedbank Group., 2010. Available at http://www.nedbankgroup.co.za/financial/Nedbank_ar2010/downloads/download%20files/5_Nedbank_sustainability.pdf [Accessed 01 February 2012].
- 25 Ibid.
- 26 Ibid.
- 27 Nedbank Group., 2011. Climate change position statement. Available at <http://www.nedbankgroup.co.za/pdfs/2011climatechangestatement.pdf> [Accessed on 18 March 2014].
- 28 Nedbank Group., 2011. Climate change position statement. Available at <http://www.nedbankgroup.co.za/pdfs/2011climatechangestatement.pdf> [Accessed 18 March 2014].
- 29 Ibid. p. 112.
- 30 Ibid.
- 31 Ibid.
- 32 Ibid. p. 107.
- 33 Nedbank., 2010. Nedbank group acknowledges both the direct and indirect impact of its operation on the environment and the resultant need to promote environmental sustainability. Available at http://www.nedbankgroup.co.za/financial/Nedbank_ar2010/sustainable/environmental.asp [Accessed 18 March 2014].
- 34 Nedbank., 2010. Nedbank group acknowledges both the direct and indirect impact of its operation on the environment and the resultant need to promote environmental sustainability. Available at http://www.nedbankgroup.co.za/financial/Nedbank_ar2010/sustainable/environmental.asp

- nedbankgroup.co.za/financial/Nedbank_ar2010/sustainable/environmental.asp [Accessed 18 March 2014].
- 35 Nedbank., 2010. Sustainable development performance. Available at http://www.nedbankgroup.co.za/financial/Nedbank_ar2010/downloads/download%20files/5_Nedbank_sustainability.pdf [Accessed 18 March 2014].
- 36 Nedbank Group., 2010. Nedbank Group Limited Integrated Report 2010. p. 106.
- 37 Nedbank., 2010. Sustainable development performance. Available at http://www.nedbankgroup.co.za/financial/Nedbank_at_r2010/downloads/download%20files/5_Nedbank_sustainability.pdf [Accessed 18 March 2014].
- 38 A negative percentage indicates that that the target set per FET has been surpassed; a positive percentage indicates that the target is still to be met.
- 39 Nedbank., 2010. Nedbank group acknowledges both the direct and indirect impact of its operation on the environment and the resultant need to promote environmental sustainability. Available at http://www.nedbankgroup.co.za/financial/Nedbank_ar2010/sustainable/environmental.asp [Accessed 18 March 2014].
- 40 Wildlife works., 2010. What is REDD+? Available at <http://www.wildlifeworks.com/redd/> [Accessed 18 March 2014].
- 41 Face the Future., 2010. Company news and media. Available at <http://www.face-thefuture.com/en/company-news-and-media> [Accessed 18 March 2014].
- 42 See the following link for the full details of how the CBBS have been achieved in the Kibale National reforestation project. Available at http://www.nedbank.co.za/website/content/mediakit/media_content.asp?page=top&article=current&prID=1353.
- 43 For full definitions of co-benefits and how they are calculated in a carbon project, readers are referred to www.climate-standards.org [Accessed 18 March 2014].
- 44 Cartwright, A., 2011. Umdoni Gel Fuel low Income Housing Project. Available at http://www.carbon.org.za/resources/docs/umdoni_pin2.pdf [Accessed 18 March 2014].
- 45 Department of Environmental Affairs., 2009. National greening. Available at <http://www.environment.gov.za/HotIssues/2009/greenGoal/NationalGreening/Soil.pdf> [Accessed 18 March 2014].
- 46 Engineering News., 2011. Nedbank Capital launches South Africa's first green index. Available at <http://www.engineeringnews.co.za/article/nedbank-capital-launches-south-africas-first-green-index-2011-08-12> [Accessed 18 March 2014].
- 47 Nedbank., 2009. Future green: Carbon finance and the future. Available at <http://www.nedbank.co.za/website/uploads/files/NedbankCapitalCarbonBrochure.pdf> [Accessed 18 March 2014].
- 48 Nedbank., 2011. Managing Nedbank group's impact. Available at <http://www.nedbankgroup.co.za/sustainEnvironmentImpact.asp> [Accessed 18 March 2014].

Santam's eco-centric journey

Working with the Insurance Industry towards a Low Carbon Economy

Soul Shava

ABSTRACT

Climate change has had a notable impact on the insurance industry, prompting them to respond against growing scientific consensus that the frequency, intensity, and geographical distribution of climate change related natural disasters is likely to increase in the foreseeable future. The emerging responses include supporting research into understanding climate change science, raising awareness and communication on climate change effects across the insurance industry and to clients, developing relevant insurance products, internal efforts to reduce the industry's carbon footprint and promote environmental sustainability, and collaborative efforts to address climate change effects. This chapter looks at some of the insurance industry's responses to the impacts of climate change, with specific reference to a case study of Santam Ltd in South Africa. Santam's breakthrough initiative comes from its efforts to engage the insurance industry in South Africa through climate change awareness processes, and to create a platform for collaboration on climate change.

INTRODUCTION

This chapter discusses the insurance sector's response to climate change effects, with specific reference to Santam Ltd, one of the insurance companies in South Africa. The chapter focuses on Santam's Eco-centric Journey as a major breakthrough that has witnessed the pulling together of the insurance sector towards understanding the low carbon and green economy terrain. The journey for Santam is marked by the hosting of a conference it organised for the insurance industry and held at its head office in Cape Town in 2009. The conference had the following objectives: i) to raise awareness of climate change and its associated risks ii) to understand environmental risk management iii) to present

a case for long term business sustainability, within the insurance industry in particular and the business sector in general in South Africa.

Climate change has a significant impact across the broad spectrum of the insurance industry through economic losses from insured assets resulting from climate change induced natural disasters. The insurance industry needs to manage its own risk exposure to climate change effects through relevant mitigation and adaptation measures. Secondly, it also needs to provide protection to its clients through raising awareness among them of climate change effects, helping them to mitigate risks and reduce losses by providing relevant knowledge, and providing better evaluation and management of climate risks. Thirdly, the insurance industry has to be exemplary in proactively reducing its environmental impact (carbon footprint), directly through internal climate change mitigation and adaptation measures to reduce carbon dioxide emissions, and indirectly through reducing the environmental impact of its supply chains. Finally, the insurance industry needs to exploit new opportunities in insurance underwriting and sustainable investment into the green and low carbon economy.

Following the Eco-centric Journey conference in 2009, Santam has been actively engaged in local and international initiatives aimed at raising awareness on climate change issues in the insurance industry and the broader business community. It has also been proactive in reducing its own carbon footprint through internal undertakings and public reporting processes.

INSURANCE IN A LOW CARBON AND GREEN ECONOMY

The growing body of evidence indicates that climate change is a reality and major impacts are anticipated in the future.¹ Reichenmiller et al state that:²

‘Climate change will continue to expose local communities to the mounting challenges – and costs – of protecting lives and assets against extreme weather and other climate-related risks.’

Anthropogenic climate change effects are causing an increase in the intensity, frequency, and geographical distribution of natural disasters, and the insurance industry is particularly impacted by this change in the risk landscape. The cumulative effects of climate change are an emerging global risk that poses a major threat to the insurance industry and its clients. As a result of the economic impacts associated with such climate change effects, the insurance industry has gradually come to accept the findings of the Intergovernmental Panel on Climate Change (IPCC)’s Fourth Assessment Report (AR4) of 2007. The IPCC AR4 asserts that warming of climate is unequivocal and that further increases in temperature are inevitable.² The AR4 draws on an analysis of a growing body

of scientific evidence in the international climate change research arena that now concurs that the earth's climate is changing and that human activity is playing a major role; the report highlights that global warming may be compounding catastrophic losses by 2 per cent per year. Hotter and dryer weather, erratic rainfall, rising sea levels, floods, and increased incidences of epidemic diseases have resulted in noticeable negative impacts. Among these negative impacts may be listed the following: the damage to property and infrastructure from flooding, storm surges and landslides; wild forest fires, affecting especially highly populated urban settlements such as megacities; the increased health claims from increase in heat waves, shifting geographical distribution of infectious diseases, and epidemic incidences (e.g. cholera, malaria, flu); and agricultural losses (e.g. crop failures and livestock losses) due to droughts and floods.

The impacts of climate change on construction, health, agriculture, transport, and tourism can result in billion-dollar worth of damage from natural disasters, and this can drastically affect the viability of the industry. This is through costly insurance claims - especially if the insured losses occur over a large scale, as well as impacts on insurance assets. Some of the record-breaking disasters have already been experienced globally, for example large scale wildfire damage in Australia, the United States, and Canada, increased incidences and intensity of sea storms and hurricanes in America (e.g. Hurricane Katrina in 2005 and Hurricane Ike in 2008), Asia, and Australia, and increased frequency and intensity of droughts in Africa. The projected increased possibility of such incidences in the future poses a continued risk to the insurance sector and their clients. Insured losses worldwide are said to have 'jumped from USD 5,1 billion per year in the period 1970-1989 to USD 27 billion annually over the last two decades'.³ Worldwide weather-related economic losses amounted to about USD 120 billion in 2008, of which USD 44 billion was insured.⁴ Duglocecki et al⁵ warn that climate change increases the possibility of insurance market failure. The insurance industry, therefore, needs to actively adapt to climate change trends if it is to survive in a low carbon and greener local and global economy.

Against a background of increasing climate change related claims and its implications for the insurance industry (huge insured catastrophe losses), the insurance industry is now showing vested interests in climate change issues. This is evident through proactive engagement in climate change initiatives to monitor trends, reduce climate impacts, and prepare for and adapt to the impacts. The Geneva Reports on Risk and Insurance Research state that:⁶

For many years insurance companies have been the driving force to study and understand climate change and have invested heavily in exploring the links between certain (natural or human-made) activities or developments and their impact on insured and uninsured risks.

The recent proliferation of insurance publications focusing on climate change related research is a direct indicator of the industry's concerns over climate change implications and the need for action.^{7, 8, 9, 10}

The importance of insurance to society is significant. The United Nations Environment Programme's Finance Initiative (UNEP FI) states that:¹¹

Insurance is essential for a viable economy. Without it, businesses and individuals would be unable to take risks and protect their assets. The availability of insurance encourages individuals to acquire assets and invest for the future.

Insurers understand the serious consequences of climate change related natural catastrophes, both for themselves and for the broader society. The insurance industry is in the business of managing risk, and climate change is one such risk. The general public and business entities look up to the insurance industry as a security against all forms of risks.¹² The insurance industry has, over time, accumulated extensive knowledge (experience and expertise) in assessing, managing, and pricing risks associated with weather events such as storms, floods and droughts. Insurers are therefore increasingly challenged to make greater efforts to safeguard their customers from climate change related natural hazards prior to limiting coverage or exiting markets.¹³

Commenting on insurance and risk, the UNEP FI¹⁴ further highlights that the insurance industry has a core mandate to have its expertise and business understand, manage, and carry risk. Risk must be measured and managed appropriately. The pricing of risk for clients enables the insurance industry to communicate risk signals. This, in many instances, serves as an important early warning system for society. The insurance safety nets for the society are provided through risk prevention and risk reduction and by sharing risks over many shoulders. As major institutional investors, the insurance industry also catalyses finance and investment, fosters innovation, shapes markets, and underpins economic development. These are all necessary building blocks in low carbon and greener economies.

The insurance industry has a particularly important role to communicate risk signals and serve as an early warning system to society. However, this should be done in a manner that does not represent the sector as messengers of bad news all the time. To prevent such from happening, insurers must also engage in actions to mitigate both the causes and consequences of climate change.¹⁵ This implies the insurance industry becoming an important stakeholder in reducing societal risk to climate change effects. The UNEP FI has developed Principles for Sustainable Insurance (Box 10.1). The principles address key fundamentals underpinning transition to a low carbon and greener economy.

Box 10.1 UNEP FI Principles for Sustainable Insurance

- **Principle 1:** Insurance will systematically consider environmental, social, and governance issues in our business principles, strategies, and operations.
- **Principle 2:** Insurance will engage with insurance industry participants to raise awareness on environmental, social, and governance issues, reduce risk and develop solutions.
- **Principle 3:** Insurance will work together with society to enhance our effectiveness in implementing the Principles.
- **Principle 4:** Insurance will be transparent by reporting on our activities and progress in implementing the Principles.

Source: Author¹⁶

A focus on considering and raising awareness on environmental issues such as climate change effects is quite evident in Principles 1 and 2. These principles are similarly echoed by ClimateWise - a collaborative international insurance initiative - in its principles. ClimateWise singles out climate change as the biggest risk multiplier of all, and is the number one risk.¹⁷ Hence, ClimateWise proposes that:¹⁸

Insurers everywhere should be using our industry's core expertise to better understand and communicate the risks climate change poses to our economic and social systems and to forge and promote solutions to bring those risks down to an acceptable level.

In raising awareness on climate change effect, the insurance industry can play a proactive role and be seen to 'practice what it preaches' through demonstrating leadership in climate change mitigation and adaptation efforts. This can be done through being pro-actively involved in reducing the insurance sector's own carbon footprint. Such can be achieved through internal mechanisms to reduce the direct environmental impacts of internal operations and of physical assets under the industry's control and indirect impacts of the supply chain. Insurers are among the largest owners of real estate and can demonstrate efforts at reducing energy consumption in their buildings and in developing carbon neutral offices and practices. The Geneva association estimated the total insurance assets to amount to 11% of all assets worldwide in 2007.¹⁹ The global Carbon Disclosure Project (CDP)²⁰, as well as the South African CDP,²¹ are among global reporting instruments and standards that can be applied to this effect. The choice of products that the insurer consumes is also important. By selecting environmentally friendly products, the insurance sector can influence the direction of the manufacturing industry by steering it towards environmentally conscious processes such as using eco-friendly technologies.

Insurers should also promote environmental consciousness among its employees at the workplace which should also help them make climate-informed choices outside the workplace. Similarly, insurers should promote climate-conscious behaviour and practices and environmentally informed choices among its clientele.²² However, insurers should

go beyond mitigating strategies to actively provide insurance products and services to society that articulate climate change effects.

Despite the negative economic impacts of climate change effects on the insurance sector, in-depth knowledge on climate change science and forecasted climate change modelling information ushers forth new opportunities for innovation to the insurance industry. These include opportunities for direct investment in the green and low carbon economy, as well as sustainable adaptation solutions, provision of new range of climate-related and environmentally conscious insurance products and services, planning for climate related uncertainties, and environmentally friendly initiatives for insurance business operations (such as being ‘carbon neutral’).²³ As global society undergoes a transition to a low carbon economy, there is precedential rise in green buildings, growth in the hybrid car manufacturing sector and in renewable energy technologies (solar, wind, geothermal, etc.), as well as energy saving measures, all of which present new opportunities and risks to the insurance industry.²⁴ The insurance industry could serve as the capitalisation mechanism for such ventures and also develop new insurance products aligned with emerging risks from such undertakings. The UNEP FI also highlights adaptive innovative measures that had started in the insurance industry as early as 2006 (Table 10.1).

Table 10.1 Climate Change Coping Measures in use by Insurers

Strategy	Regulatory Risk	Market Risk	Business Risk
Reduce risk	Engage with government on flood defence funding and land zoning (UK), and building standards (US, Fiji)	Withdraw from high-risk areas (US). Avoid catastrophic risk like flood (most countries)	Understand the sensitivity of new industries and locations (reinsurers)
Price risk correctly	Seek approval to modify prices based on risk modelling (US)	Seasonal forecasts for hurricane risk (reinsurers) Trend allowance for climate change (rare)	Use GIS to discriminate risks (UK, US)
Transfer risk	Seek government backup (France)	Reinsurance (universal)	Seek alternatives to reinsurance (brokers)
Check aggregate	Stress-test exposure by disaster scenarios (rating agencies, licensing authorities – common)	Internal capital-rationing (risk-based capital - common)	Consider asset-liability correlation (rare)
Control loss	Defend actions that seek to expand coverage (US)	Contingency planning, pre-event deployment (US)	Advanced techniques for subsidence repairs (UK)
Diversify risk base	Open up new markets e.g. rainfall insurance and reinsurance (India)	Multiline insurance portfolio (universal)	Mine data to exploit new markets (some reinsurers)

Source: UNEP FI²⁵

The insurance sector is also seen playing a major role in terms of green and carbon related insurance. Green insurance usually includes two product areas, namely: insurance products that differentiate insurance premiums on the basis of environmentally related characteristics; and insurance products tailored for clean technology and emission reducing activities.²⁶ Some of the examples falling within the green insurance sector include green auto insurance and insuring energy efficient buildings. Carbon insurance, on the other hand, offers insurance for products in order to manage carbon credit price volatility.

With regard to South Africa, climate change and related natural catastrophes are being recognised as a significant emerging issue in the insurance industry sector.²⁷ This necessitates the inclusion of climate change as a dynamic component of insurance risk assessments. Recent incidences such as the flooding of the Kruger Park in 2012, the Orange River in the Northern Cape in 2011, the Vaal River in Gauteng in 2011, as well as recent forest wildfires and flash floods that have ravaged the Western Cape in South Africa are notable examples of climate change related catastrophes in the local contexts.²⁸ It is imperative that the insurance industry in South Africa realises the economic impacts of climate change and responds to the changing insurance landscape through engaging in climate change research initiatives, creating climate awareness (providing relevant information) among clients, developing relevant insurance products, and investing in the low carbon and green economy. Santam Ltd's efforts to raise awareness and engender collaborative action in the insurance industry in South Africa are a response to this need.

SANTAM'S ECO-CENTRIC JOURNEY

Santam is a short term insurer in South Africa that provides personal, commercial, specialist, and agriculture insurance products (Santam Personal, Commercial, Specialist Business, and Agriculture Divisions). Santam, as a future-focused company, acknowledges that systemic risks such as climate change cannot be ignored and recognises that it can play a leading role in the insurance sector in promoting pragmatic and collaborative risk management in society and the economy. Santam was, in 2009, the first South African insurance company to join ClimateWise, a global collaborative insurance initiative which aims to respond to the myriad challenges and opportunities of climate change to the industry. Santam undertook to implement the six ClimateWise Principles, which every member is expected to report against.²⁹ These are provided in Box 10.2.

Box 10.2: ClimateWise Principles:

- Lead in risk analysis
- Inform public policy making
- Support climate awareness amongst our customers
- Incorporate climate change into our investment strategies
- Reduce the environmental impact of our business
- Report and be accountable.

The ClimateWise principles provided Santam with a platform where it could contribute to initiating collective action processes on climate risks and opportunities in the South African insurance context. Under the guidance of these principles, especially the second and third, Santam organised the Eco-centric Journey Conference in Cape Town in September 2009. The major purpose of the conference was to raise awareness and foster dialogue on climate change and its implications to the insurance industry specifically, and the business sector stakeholders in general. This arose from a realisation that environmental and sustainability awareness, especially on climate change, was very low at the time in the South African insurance sector. The basis of the Eco-centric Journey theme was that stakeholders needed to combine both economic and ecological sustainability aspects in order to collaboratively address climate change issues. This is an aspect that clearly marked a breakthrough in terms of the initial understanding and pulling together of the South African insurance sector as it grappled with the concepts of low carbon and the green economy. This was enhanced by the fact that the world was in the middle of the 2008 global financial meltdown. The focus of the conference was on climate change, environmental risk, and the insurance industry. The aims of the conference were for it to serve as a platform:

- To raise awareness about the impacts of climate change on the insurance industry
- To create hubs and discussion forums to start thinking about ways for stakeholders to collectively address this issue
- To facilitate learning from local and international experts from various sectors in the climate change arena.

By bringing together insurance stakeholders for the first time in South Africa to deliberate on climate change issues and their impact on the industry, the conference created opportunities for further engagement within the South African insurance industry to promote collaborative climate risk management.

Aspects covered in presentations during the Eco-centric Journey Conference included the challenges posed by climate change to the business sector; business environment and sustainability consciousness; energy efficiency in business; green business and economic responses to climate change; strategic approaches to climate change and sustainable development; climate change impacts to the South African agricultural sector;

environmental risk management of fire in South Africa; climate change science and technology; mapping of global environmental risks; private-public sector partnerships in climate change underwriting; climate change adaptation; climate change challenges and opportunities to the insurance industry; and collaborative responses by the insurance sector to climate change.

Following the landmark Eco-centric Journey Conference, Santam has continued its efforts to educate and raise awareness on environmental and sustainability issues by employing marketing and communication channels. These sustained efforts include:

- Staff awareness of sustainability issues through its internal communication platforms
- Media education briefings and press releases on climate risk management and related issues
- A corporate leadership piece on systemic risk by Ian Kirk, the Santam Chief Executive, published in the 2010 issue of the annual *Dialogue Environmental Handbook*
- Santam sponsoring South African sustainability expert Robert Ziplies on his 3000 km Climate Challenge tour of South Africa on an electric bicycle aimed to raise awareness about climate change in 2009 in South Africa cities, culminating in Durban on 5 December 2009, two days before the start of the international Copenhagen climate negotiations
- The participation of Santam Chief Executive, Ian Kirk, in a panel discussion on 'The Implication of COP 15 for business' organised by the Cambridge Programme for Sustainability Leadership in February 2010
- Co-hosting the UNEP FI Principles for Sustainable Insurance regional consultative event with the South African Insurance Association (SAIA) in March 2010 in Johannesburg
- The publication of the Eden Study Report (a research partnership between the Santam Group, the World Wildlife Fund, the University of Cape Town, and the Council for Scientific and Industrial Research, in collaboration with the United Nations Environment Programme Finance Initiative) which was shared at the UN's COP17 held in Durban, South Africa, in 2011.

On 29 March 2011, Santam became the joint-winner of the Climate Change Leadership Award (private sector category) for having identified and positioned the company to manage the risks and opportunities associated with climate change. The Climate Change Leadership Awards (CCLA) are the first awards in South Africa to recognise, reward, motivate, and celebrate South African businesses, communities, individuals, youth, and schools that are taking the lead through positive voluntary action by implementing a range of activities to combat global warming.

OTHER LOW CARBON AND GREEN ECONOMY INITIATIVES BY SANTAM

A number of other low carbon and green economy initiatives are identifiable from Santam. These include, among others: environmental reporting, integrating of climate change issues in risk assessments; supply chain environmental consciousness; and client targeted initiatives. The highlighted initiatives will be considered briefly in the following sub-sections.

ENVIRONMENTAL REPORTING

As a member of ClimateWise, Santam has to periodically report on its progress with regard to the ClimateWise principles. Santam actively participates in the ClimateWise's working group on climate adaptation in developing countries. In 2010 Santam joined UNEP FI and actively contributed to the Principles of Sustainable Insurance (PSI) working group. The PSI working group has developed a set of globally applicable best practice principles which Santam and other members have to adhere to.

Santam is a member of the CDP in South Africa. The CDP is an independent non-profit organisation that strives for greenhouse gas (CHG) emissions reduction and sustainable water use by business entities and cities.³⁰ The CDP works in partnership with the National Business Initiative (NBI) in South Africa. CDP has challenged the world's companies to measure and report their carbon emissions and to integrate the long term value and cost of climate change into their assessment of the financial health and future prospects of their business against a set of performance indices, namely the Carbon Disclosure Leadership Index (CDLI) and Carbon Performance Leadership Index (CPLI). Through participating in the CDP, Santam has the opportunity to disclose its direct emissions of greenhouse gases using a globally recognised standard and to work towards minimising them.

Locally, Santam is a member of the SAIA and participates in its environmental awareness initiatives by coordinating the SAIA's Sustainable Insurance Forum. Through participating and contributing to these various environment and climate change related initiatives, Santam is gaining a better understanding of systemic risks and opportunities and, therefore, enabling it to create a comprehensive approach to address them.

INTEGRATING CLIMATE CHANGE ISSUES

In order for Santam to respond to the risks and opportunities that climate change presents, it had to ensure that, as an organisation, it understands its own environmental impact, and first focus its efforts on reducing this. In doing this, great emphasis is being placed on employee environmental awareness and the implementation of an environmental policy with targets to manage the company's carbon footprint. Santam formed the Santam Environmental Forum in April 2009 'to lead discussions around climate change implications for Santam and to maintain the company's environmental position in the

long run'.³¹ Its philosophical take was 'to build climate risk management into the business rather than bolt it on'.³² Following the implementation of Santam's Environment Policy and Environment Targets in 2009:

- Employee awareness and education is ongoing, with the aim of instilling a 'savings culture' by encouraging employees to consider the implications of their resource consumption patterns at work and at home and work towards reducing them. Staff education, awareness and involvement are key to issues around travel, energy, water, and paper consumption reduction and recycling activities.
- Energy efficient initiatives to reduce consumption have been initiated such as controlled office lighting and reduced air-conditioning consumption. A pilot project for an energy management system has been launched at the Santam Illovo office and is being expanded into other office buildings.
- Santam has revised its travel policy to implement initiatives to reduce business travel, such as video and telecommunication facilities, and improved travel policy and travel management. This has resulted in a 20% reduction in travel costs (in 2009 compared to the same period in the previous year) and a lowering of its carbon footprint.
- Santam has implemented initiatives to reduce paper consumption. This includes paper recycling and increased use of electronic media, such as the establishment of an electronic distribution and management system for its insurance policy documents.
- Eco-friendly event planning is implemented at major Santam events in an effort to drive home a consistent message about environmental consciousness. During events, Santam avoids the use of bottled water, uses as much recyclable materials as possible, and takes into account environmental factors when selecting venues.

The above internal strategies reveal the extent of integration of climate change mitigation efforts by Santam. These strategies contribute towards reduction of the company's carbon footprint.

SUPPLY CHAIN ENVIRONMENTAL CONSCIOUSNESS AND CLIENT TARGETED INITIATIVES

Santam reviewed its procurement policy in 2010 to include a clause which proposes that suppliers of Santam should make significant efforts to comply with relevant environmental legislation and consider their environment impact in their business operations.³³

In addition to the above, Santam has also embarked on some environmental sustainability initiatives directly targeting its clients. In 2010, Santam launched a solar geyser replacement pilot initiative which gives clients the option of installing a solar geyser in

the event of making a claim for an electric geyser replacement. This collaborative initiative with government was not just aimed at cost savings for their clients but also to help reduce the carbon footprint. In addition, Santam Agriculture continually advises farmers on weather and climate related risks through a website dedicated to them, thereby helping them to understand climate change and to make climate-informed decisions in their business. Moreover, Santam Agriculture educates clients on environmentally friendly and sustainable agricultural practices.

The various strategies and initiatives Santam is adopting above are steps that enable it to achieve climate change excellence as laid down for the insurance industry by the Geneva Association.³⁴ They also align with the UNEP FI Principles for Sustainable Insurance in Box 1 and the ClimateWise principles in Box 2 above.

CONCLUSION

Santam has taken a proactive role in promoting insurance industry collaborative stakeholder engagement and action on climate change issues in South Africa through the Eco-centric Journey that started in 2009. There are also other low carbon and green economy internal and external awareness and environmental sustainability education initiatives. The insurance industry acknowledges that systemic risks are shared risks which require a collective management approach. Santam is making a contribution through its membership to ClimateWise and UNEP FI internationally, and actively participating in the South African Insurance Association initiatives locally. Santam also believes that insurance should add value and accepts that the insurance industry has a role to play in the economic and environmental well-being of South Africa.

Santam has indeed embarked on its Eco-centric Journey and is setting the pace for other stakeholders in the insurance industry to seriously consider the negative and positive implications of climate change on their business and to take proactive action on climate change issues. Although Santam's approach encompasses many elements of climate change, the company realises the value (for Santam and its partners) of encouraging behaviour that will help reduce carbon emissions. Santam is achieving this through the integration of climate change and sustainability aspects within the company to reduce its carbon footprint. However, for Santam and the South African insurance industry in general, this should also include the development of innovative climate change related insurance products. This encompasses coverage of green or low carbon business initiatives, investment in climate change solutions, and financial incentives (reduced premiums) for clients investing in mitigating the impacts of climate change.

NOTES AND REFERENCES

- 1 IPCC (Intergovernmental Panel on Climate Change), 2007. Climate change 2007: the physical science basis. The Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
- 2 Dugloceki, et al., 2009. Coping with climate change: risks and opportunities for insurers. London: Chartered Insurance Institute.
- 3 Reichenmiller, et al., 2010. p. 3.
- 4 Mills, E., 2009. A global review of insurance industry responses to climate change. *The Geneva Papers on Risk and Insurance –Issues and Practices*, 34(3), pp. 323–359. The International Association for Study of Insurance Economics 1018-5895/09.
- 5 Dugloceki, et al., 2009. Op Cit.
- 6 The Geneva Association (The International Association for the Study of Insurance Economics), 2009. The insurance industry and climate change – contribution to the global debate. The Geneva Reports: Risk and Insurance Research, No. 2, July 2009. Geneva: The Geneva Association. p. 18.
- 7 Reichenmiller et al. Op Cit.
- 8 Association of British Insurers (ABI), 2009. Assessing the risks of climate change: financial implications. London: Association of British Insurers.
- 9 Allianz Group and World Wildlife Foundation., 2006. Climate change and insurance: an agenda for action in the United States. New York: Allianz Group and WWF.
- 10 Lloyds., 2006. Climate change: adapt or bust. London: Lloyds.
- 11 United Nations Environment Programme Finance Initiative (UNEP FI), 2007. Insuring for sustainability: why and how leaders are doing it. Geneva, UNEP FI Insurance Working Group. p. 10.
- 12 Ward, R.E.T. Herweijer, C. Patmore, N. and Miur-Wood, R., 2008. The role of insurers in promoting adaptation to the impacts of climate change. *The Geneva Papers*, 2008, 33, (133–139). The International Association for the Study of Insurance Economics 1018-5895/08.
- 13 Mills, E. Op Cit.
- 14 United Nations Environment Programme Finance Initiative (UNEP FI), 2011. The principles for sustainable insurance. Geneva, UNEP FI. p. 6.
- 15 The Geneva Association., 2009. Op Cit. p. 62.
- 16 United Nations Environment Programme Finance Initiative (UNEP FI), 2011. Op Cit.
- 17 PricewaterhouseCoopers (PWC), 2011. ClimateWise principles: the fourth independent review 2011. London: ClimateWise.
- 18 Ibid.
- 19 The Geneva Association., 2009. Op Cit.
- 20 See www.cdproject.net.
- 21 Carbon Disclosure Project (CDP), 2011. CDP South Africa JSE 100 Report 2011: Partnering for a low carbon future. CDP.
- 22 PricewaterhouseCoopers (PWC), 2011. Op Cit.
- 23 The Geneva Association., 2009. Op Cit.
- 24 Mills, E., 2008. From risk to opportunity. Insurer responses to climate change. A Ceres Report. Ceres.
- 25 UNEP FI., 2006. Adaptation and Vulnerability to Climate Change: The Role of the Finance Sector. Nairobi: UNEP FI. p. 19 based on Andlug Consulting.

- 26 UNEP FI., 2007. Green financial products and services: Current state of play and future opportunities. Nairobi: ENEP FI.
- 27 Metcalfe, B., 2010. Strategic and emerging issues in South African insurance 2010. Johannesburg: PricewaterhouseCoopers.
- 28 See the following news articles: News24. 18 January 2012. Flooding causes chaos at Kruger Park. Available at <http://www.news24.com/SouthAfrica/news/Flooding-cuases-chaos-at-Kurger-Park-20120118> [Accessed 17 February 2012]; Times Live. 13 January 2011. 11 rescued as Orange River floods. Available at <http://www.timeslive.co.za/loca/article849724.ece/11-rescued-as-Orange-River-floods> [Accessed 17 February 2012]; News24. 06 January 2011. Vaal River flood warning issued. Available at <http://www.news24.com/SouthAfrica/News/Vaal-River-flood-warning-issued-20110106> [Accessed 17 February 2012]; IOL News. 7 July 2008. Floods leave thousands homeless. Available at <http://www.co.za/news/south-africa/floods-leaves-thousands-homeless-1.407281> [Accessed 17 February 2012]; IOL News. 27 January 2008. Devastating fires 'worst ever'. Available at <http://www.iol.co.za/news/south-africa/devastating-forest-fires-worst-ever-1.387080> [Accessed 17 February 2012].
- 29 PricewaterhouseCoopers (PWC), 2011. Op Cit.
- 30 Carbon Disclosure Project., 2012. News and announcements. Available at www.cdproject.net [Accessed 23 July 2012].
- 31 Santam., 2010. ClimateWise Report. Santam. p. 6.
- 32 Ibid.
- 33 Ibid.
- 34 The Geneva Association., 2009. Op Cit p. 3.

Addressing climate change through resource efficiency and combined heat and power systems at Mondi

Madeleine Fombad and Godwell Nhamo

ABSTRACT

There are many green economy initiatives that emerged from the Mondi case study. The initiatives fall within two key thematic areas, namely: forestry and climate change, as well as aspects relating to environmental performance. The flagship breakthrough for the group, however, was identified as addressing climate change through resource efficiency and combined heat and power systems. This initiative resulted in electricity self-sufficiency at 93 per cent across the group globally with all of its own electricity generated by combined heat and power. Other green economy initiatives that emerged include having all plantations in South Africa managed sustainably and verified by the Forestry Stewardship Council Certification, and having 33 per cent of fibre consumed across the group coming from recovered fibre.

INTRODUCTION

This chapter examines the concerted contribution of Mondi, one of the two major South African paper and pulp industry players in its transition to a low carbon and greener company. Mondi's breakthrough is realised by the manner in which the group addresses climate change through resource efficiency and combined heat and power systems. The Mondi group first considered the risk and opportunities posed by climate change in 2005 when it set a target to reduce both specific energy consumption and CO₂ emissions by 15 per cent in 2014. Between 2004 and 2012, specific GHG emissions were reduced by more than 25 per cent against a 2004 base year.¹ This has been achieved mainly through resource efficiency and combined heat and power systems. The group also achieved 93 per cent electricity self-sufficiency across all material operations.²

The rapid industrialisation of developing economies like Brazil, China, India, Mexico, and South Africa has resulted in a significant consumption of paper and paper board products. In China, for example, paper and paper board consumption tripled between 1990 and 2003 to reach an all-time high of 48 million tonnes.³ Such huge consumption patterns of paper were evident as the green economy drive had not taken root. It was also estimated that by 2010 China's annual consumption of fibre for paper production will reach 60 million tonnes or more. The pulp and paper industry is one of the most energy intensive manufacturing industries that significantly enhance South Africa's Gross Domestic Product (GDP).⁴ Similar to other energy intensive manufacturing industries, this industry emits large amounts of greenhouse gases (GHGs) and consumes large quantities of water during the manufacturing process.⁵

GHGs are a confirmed source of global warming that leads to climate change. Hence, the latest challenge for the pulp and paper industry (Mondi included) is to go 'carbon neutral' and improve energy efficiency and GHG emissions by using natural resources in an efficient way. In this regard, major forest products associations are 'doing something' about their significant carbon emissions with The Forest Products Association of Canada (FPAC) having announced that by 2015 it would become the country's first 'carbon-neutral' sector.⁶ The World Business Council on Sustainable Development (WBCSD)⁷ understands carbon neutrality as a situation where 'the net transfers of biogenic carbon to the atmosphere are zero' – a carbon-cycle neutrality. The Confederation of European Paper Industries (CEPI) announced a 2050 roadmap to a low carbon bio-economy. The CEPI set an 80 per cent reduction in carbon emissions by 2050.⁸ The Energy Efficiency Strategy of the Republic of South Africa,⁹ that sets a national target for energy efficiency improvement of 12 per cent by 2015, and the National Energy Act,¹⁰ prioritise the importance of improving energy efficiency to save resources and environmental management.

The main focus of the Mondi group is on integrated paper and packaging production and uncoated fine paper. In 2012 there were 25 700 people employed across 30 countries.¹¹ The group's revenue stood at 5,8 billion. Mondi owns and/or leases an estimated 305 952 hectares of land in South Africa, of which 66 per cent are under hard and softwoods. The group further leases and manages up to 2,41 million hectares of softwood boreal forests in Russia.¹² The major business focus of Mondi includes the manufacturing of pulp and paper; packaging of paper, and the growing of wood.

TRANSITION TO GREEN ECONOMY IN PULP AND PAPER INDUSTRY

For one to fully comprehend and appreciate what the Mondi group is doing in terms of its path to a greener company, it is necessary to outline some facts associated with the following key components: understanding the pulp and paper industry; how climate change is being addressed in the group; aspects relating to the management of operations and resource protection.

PULP AND PAPER INDUSTRY

The pulp and paper industries are facilities that engage in the manufacture of pulp, paper, and paperboard.¹³ Paper was first invented in ancient China some 2 000 years ago by Tsái Lun,¹⁴ with the production of paper increasing by more than 460 per cent between 1961 and 2004. The demand for paper in the world is expected to grow by 2,1 per cent annually by the year 2020.¹⁵ South Africa produces 316 000 tonnes of newsprint and 970 000 tonnes of printing and writing paper per year.¹⁶ Wood, both hardwood (eucalyptus) and soft wood (pine), currently provides approximately 90 per cent of global pulp production. Pulp is used predominantly as a major component in the manufacture of paper and paperboard and a diversity of products including rayon, photographic films, cellophane, and explosives.¹⁷ The manufacturing process of paper consists of the following six stages: wood preparation; pulping (chemical, semi-chemical, mechanical, and waste paper); bleaching; chemical recovery, pulp drying (non-integrated mills only); and papermaking.¹⁸ The largest portion of pulp used for paper making is currently derived from virgin forests. In the US alone, an estimated 67 per cent of virgin fibre is fed into the pulp mills.¹⁹ Globally, there was a 3 per cent loss of forests from 1990 to 2005,²⁰ which translates to an average total loss of about 0,2 per cent annually. In developing and emerging economies, however, this deforestation is mainly due to the need for more agricultural land.

Increased demand for pulp may have far-reaching consequences for forest sustainability and rural livelihoods. In addition, paper production has huge and far reaching impacts, including huge energy intakes, pollution and climate change impacts, as well as increased waste generation. Paper waste, which is part of packaging waste, forms the bulk of municipal solid wastes (MSW) that end up on landfill sites. Environmental impacts from this waste are not only associated with its management in the main waste stream, but also its production, transportation as well as during its use.²¹ The impacts include air pollutants and GHGs like methane, use of fresh water and wastewater discharge, depletion of non-renewable natural resources, and the damage resulting from extraction and filling up limited landfill space.²² For South Africa, great efforts are being made towards recovering paper for recycling. Statistics provided by the Paper Recycling Association of South Africa (PRASA) in 2012 showed that the rate of recovered paper rose from about 58 per cent in 2010 to 60 per cent in 2011.²³ The total consumption of paper stood at about 2,404 million tonnes. Of this amount, 8 per cent was exported in agricultural products whilst 17 per cent was utilised for recovery.

ADDRESSING CLIMATE CHANGE

The largest source of GHGs released in the pulp and paper industry comes from the energy production to power the mills. A 2007 Green Press Initiative Report²⁴ revealed that each year more than 20 million trees are consumed for the production of paper and about

95 million trees are consumed for newsprint. In addition, 9 per cent of total carbon dioxide emissions are from manufacturing paper waste that forms the bulk of municipal solid wastes which makes up 26 per cent of landfills, where one of the chief GHG, methane, is generated from the processes.²⁵ Major GHG emitted by the pulp and paper manufacturing industry are carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydro fluorocarbons (HFCs), Per-fluorocarbons (PFCs) and Sulphur Hexafluoride (SF₆).^{26,27}

In South Africa, it is important to note that the fibre comes from responsibly managed plantations, which represent a sustainable and renewable resource. The Paper Manufacturers Association of South Africa (PAMSA)²⁸ cites 2 011 figures from Forestry South Africa that indicate that the timber plantations in the country, for which the pulp and paper is harvested as well as furniture and other wood-based products, sink close to 900 million tonnes of CO₂. In addition, a mere 9 per cent of only mature trees of the total plantations is harvested on yearly basis and this harvest is replaced in the same year.

In spite of its high energy consumption, the pulp and paper industry is one of the most energy efficient industries. It produces energy as one of its by-products and also generates approximately 50 per cent of its own energy from biomass residues. There are possibilities that the industry could develop into a clean energy supplier if residues are used efficiently.²⁹ Almost 48 per cent of the paper production in the world is recycled with more than 70 per cent recycled in Germany, Finland, Switzerland, Sweden, and Japan.³⁰ However, emissions continue to increase as a result of the expansion and growth of this industry, making climate mitigation measures an imperative. In total, 40 million tonnes of carbon dioxide produced annually is equivalent to roughly 1 per cent of total GHG emissions in the European Union.³¹ The Kyoto Protocol sets several targets for reducing energy consumption and emission of GHGs. One such is the current market mechanism known as the Clean Development Mechanism (CDM). The CDM aims at triggering changes in the pattern of emission in intensive activities in developing countries through nationally appropriate mitigation actions and industry specific mechanisms. The CDM also links efforts of GHG emissions between the developed and developing countries. Globally governments are also working towards new approaches for a Post Kyoto regime.³² Several emission reduction measures in the pulp and paper industry have been underscored and will be discussed both within and outside this section,³³ and such measures include:

- Improving the energy efficiency of processes
- The use of cleaner fuels and the re-use of biomass generated by the process
- The use of combined heat and power and other technologies to cover the electricity and heat needs (discussed in depth under the Mondi breakthrough)
- Management operations
- Protecting the source.

Energy efficiency is generally regarded as the most cost-effective, least polluting, and most readily-accessible industrial initiative for mitigating climate change. One of the

major objectives of energy conservation measures in the pulp and paper industry is to reduce the purchased energy and to recover substantial amount of energy from the internal waste fuels. The former South African Department of Mineral and Energy³⁴ forecast the possibility for improving energy efficiency in the pulp and paper industry and potential energy saving of 8 per cent by the year 2016. The department is now split into two: one focusing on mineral resources and the other on energy. This will be realised when measures are taken in areas that include efficient motors, lighting, and compressed air. The most generic classification scheme for industrial mitigation energy efforts consists of the three dimensions of a value chain, namely: input, process, and output.³⁵

Efficiency reduction techniques may also be in terms of short, medium, and long term measures.³⁶ Short term measures are techniques that will lead to the effective use of energy and lowering of the unit consumption without any substantial investment. Medium term measures involve, amongst others, the modifications of processes and materials, recovery of waste heat, and self power generation. Some of the long term measures are better site arrangement, excess power generation for the grid, and the adaptation of the new emerging processes.³⁷

One of the unique contributions by the pulp and paper industry to climate change mitigation lies in the use of biomass. Biomass is any typically plant-based, organic matter produced through photosynthesis as plants convert the sun's energy into chemical energy. This is available on a renewable or recurring basis with a carbon neutral energy source.³⁸ Biomass can be used in its solid, gaseous, or liquid form. The conversion of biomass involves converting biomass feedstock into energy that will be used to generate electricity and/or heat.

There are several cost effective technologies for converting biomass feedstock to electricity and heat. Amongst these are combustion, combined heat and power (CHP), anaerobic digesters for animal waste or wastewater, and direct-fired boiler systems that convert renewable biomass fuels to heat and electricity using processes similar to those employed with fossil fuel.³⁹ Other emerging biomass conversion technologies are fixed bed gasifiers and fluidised bed gasifiers that convert woody biomass feedstock to useable fuel through gasification processes. Sustainably managed biomass resources are green and renewable and do not contribute to global warming. It is also a good source for energy recovery and for obtaining valuable chemicals.⁴⁰ These by-products are used as fuels resulting in significant reduction in the cost of raw material costs (i.e., avoided pulping chemical purchases) and waste generation.

Biogas is another major renewable source of energy in the pulp and paper industry. It involves the following processes: biomass converted to gas and made available for a broader range of energy devices, heating or cooking, electricity or mechanical work or used for producing higher quality fuels or chemical products such as hydrogen.⁴¹ Biogas is a by-product of anaerobic digestion of organic waste such as biological sludge formed in waste-water treatment and is usually costly to dispose of, as it cannot be changed easily.⁴² Another renewable energy source is black liquor.

Black liquor is a by-product from chemical processing that produces wood pulp for papermaking. A main ingredient in black liquor is lignin, the 'material in trees that binds wood fibres together and makes them rigid, and which must be removed from wood fibres to create paper'.⁴³ Black liquor contains a large amount of biomass and is burned as a biomass fuel.⁴⁴ To this end, this carbon neutral, biomass-based material is used extensively as fuel in the pulp and paper industry to generate electricity and heat that is required to eliminate water from pulp. In the processes, wood chips are fed into a digester. The lignin and other organic materials dissolve and come out of the digester as weak black liquor. This weak black liquor has approximately 15 per cent solid content by weight and in this state it cannot be burned.⁴⁵ The liquor is then evaporated to raise the solid content by moving it through a sequence of concentrators. The stronger black liquor then reaches the boiler or gasifiers at about 75 per cent solid content. In the recovery unit the black liquor converts its chemical energy fully (through the recovery boiler) or partially (through gasification).⁴⁶ Hence, the pulp and paper industry could supply such alternative energy and contribute towards the global goal to reduce GHG emissions.

MANAGEMENT OPERATIONS AND SOURCE PROTECTION

As highlighted earlier, efficiency in industrial energy can be enhanced by effective management of energy use in operations and processes.⁴⁷ The training of staff on the companies' general approach to energy efficiency and reward systems may yield good results.⁴⁸ In countries such as Canada, Denmark, Ireland, Sweden, and the United States of America (US) there are voluntary corporate energy management standards. The use of energy audits will enhance the opportunities for reducing energy use. The Environment Protection Agency⁴⁹ identified several management tools that can reduce energy use. Amongst these are organisational practices and policies; team development; planning and evaluation; tracking and measurement; communication, employee engagement; and evaluation and corrective measures.

Having reviewed the literature on the pulp and paper industry, how the industry has been addressing climate change in order to move towards a low carbon and greener future, as well as dealing with management and source measures, we now move on to consider the role of Mondi in more detail. The following sections will address the Mondi business case for transition to a green economy, enablers, the breakthrough, as well as challenges and planned future initiatives within the company.

MONDI'S BUSINESS CASE FOR GREEN ECONOMY TRANSITION

Mondi identified three categories associated with climate change risks and opportunities as they relate to the green economy and sustainable development. These include regulatory, physical, and those classified under the 'other' category, such as reputation and cost

savings.⁵⁰ In the European Union, the group has an imposed cap on carbon emissions, given that the different countries in this region are under an obligation to reduce emissions under the Kyoto Protocol.⁵¹ Although South Africa is not under any obligation to reduce GHG emissions under the terms of the Kyoto Protocol, in 2009 the country pledged to reduce emissions as discussed in chapter 2. There is also a chance that environmental legislation linked to climate change drives energy, wood, and transport costs. The Carbon Disclosure Project (CDP),⁵² CDP Water,⁵³ the United Nations Global Compact, and the Johannesburg Stock Exchange Socially Responsible Investment (JSE SRI) Index were also highlighted as additional self-regulatory mechanisms of importance to Mondi and the South African operations.

With regard to the physical risks, South Africa was seen to be the most vulnerable compared to other countries in which Mondi has operations. The country is said to be water-scarce, and the impact of climate change is likely to increase water shortage.⁵⁴ Consequently, water supply risk to Mondi business becomes a challenge.⁵⁵ The South African government has already put restrictions in terms of the expansion of plantation forestry due to water and biodiversity concerns. The customers at the end of the value chain are also increasingly interested in carbon neutrality and demand climate-compliant products that impact less on the environment.⁵⁶ As a largely coal-based economy, the purchased electricity component of the energy requirement for pulp and paper manufacturing operations in South Africa are heavily dependent on fossil fuels. Hence, the products from Mondi and other pulp and paper industries produced in South Africa will inherently have high carbon content.⁵⁷ This will have serious negative implications in terms of marketing the products in countries with stringent carbon footprint regulations.

ENABLERS FOR MONDI'S GREEN ECONOMY TRANSITION

A number of policies have been put in place by Mondi in order to see the company move in the direction that satisfies low carbon and greener operations. Mondi's Sustainable Development Policy outlines the overall strategy and it is supported by sector policies covering seven key sustainable development aspects. Amongst these seven key sustainable development aspects are sustainable forestry, environmental performance, *climate change*,⁵⁸ and product stewardship (Figure 11.1). All seven sector policies apply across all of Mondi's owned and managed operations.⁵⁹

Figure 11.1: Mondi's Sustainable Development PolicySource: Author⁶⁰

Mondi's environmental policy commits to: cleaner production; conservation of raw material, water and energy; reducing the quantity and toxicity of all emissions from operations; use of best available technology; as well as investment in clean technology.⁶¹ With regards to climate change, the group's Climate Change Policy makes it clear that Mondi understands its active role in reducing GHG emissions. The group then outlines the need to improve its energy intensity; maximise existing Combined Heat and Power for energy generation; increase the use of carbon neutral biomass-based fuels; support carbon trade; and promote sustainable forest management practices.⁶² The group also commits to product stewardship that is based on the whole life-cycle initiative that draws from the principle of cradle-to-cradle – from life to life.⁶³

In line with Mondi's Climate Change Policy, the group committed to reduce emissions of CO₂ from the use of fossil fuels by 15 per cent in 2014 against a 2004 base year.⁶⁴ The mitigation strategy includes the utilisation of biomass to produce primary energy, carbon footprint reduction, and participation in carbon disclosure benchmarking. The mitigation strategy is controlled by:⁶⁵

- internal and external reporting on the Group's GHG commitments (in 2012 the reduction of specific GHG emissions by more than 25% against a 2004 base year was achieved)
- an increase in the ratio of biomass use for energy generation (58% realised in 2012)
- the provision of product carbon footprint calculations.

Accountability for sustainable development policies, systems, practices, commitments, and actions at Mondi is assured at every level of business. This is achieved through the Dual Listed Company (DLC). A DLC Sustainable Development Committee (DLC-SDC), the DLC Executive Committee and five global specialist network groups all work together in assisting Mondi to move closer to a fully recognised low carbon and greener global entity.⁶⁶ There is also a Sustainable Development Leadership Panel (SDLP) made up of divisional management and sustainable development experts from across the group. The SDLP is chaired by the group technical director. Its role is to advise and support the DLC Executive Committee and operations managers.⁶⁷ The DLC-SDC is chaired by an independent non-executive director and its members include the Mondi group's chief executive. Furthermore, the DLC-SDC provides assurance to the Boards of Mondi Limited and Mondi PLC by ensuring that there are appropriate systems and practices in place to effectively deal with sustainability risks and opportunities, including climate change and transition to green economy. In addition, the DLC-SDC ensures that the group's Sustainable Development Strategy, policies and commitments remain relevant and consistent with global best practice. The group also invests in training, education, consultation, audit, and other resources to ensure that they are widely understood and implemented.⁶⁸

During 2010 the group introduced an intranet-based product carbon footprint calculation tool for all its products. Mondi takes pride in being recognised for its green and low carbon initiatives that are strongly linked to the group's sustainability epoch. This has witnessed Mondi's:

...Inclusion in the FTSE4Good Global, European, and UK Index Series (since 2008) and the JSE's Socially Responsible Investment (SRI) Index since 2007. The group was also included in the Carbon Disclosure Project's (CDP) FTSE 350 Carbon Disclosure Leadership Index (CDLI) for the third year and in CDP's FTSE 350 Carbon Performance Leadership Index (CPLI) for the first time in 2012.⁶⁹

RESOURCE EFFICIENCY AND COMBINED HEAT AND POWER IN PULP AND PAPER INDUSTRIES

As indicated in the introduction, Mondi's green economy breakthrough is associated with resource efficiency and combined heat and power (CHP) systems. Mondi identified the maximisation on the use of CHP technology as a key channel in which CO₂ emissions can be significantly reduced.⁷⁰ As mentioned earlier, the reduction of specific energy consumption and the substitution of fossil fuels by biomass have resulted in a 23 per cent reduction of carbon dioxide equivalent (CO₂e) emissions from Mondi's operations. In South Africa, on-site generated electricity using biomass and combined heat and power installations has a much lower CO₂e factor compared to the national grid, resulting in a further reduction of CO₂e.

In the paper and pulp industry the use of CHP is common. CHP represents an integrated energy system that can use a variety of fuels such as biomass/biogas, natural gas, coal, wood chips, and fuel oil and black liquor. CHP is the single largest solution to meeting the Kyoto Protocol on climate change.⁷¹ In Europe, around 10 per cent of electricity and heat requirements come from CHP.⁷² More than 60 per cent of biomass-powered electricity generation in the United States is in the form of CHP.⁷³ Examples of common CHP technology are chemical recovery furnaces and steam turbine systems. Major industrial CHP 'prime mover' technologies include steam turbines, gas turbines (Figure 11.2), reciprocating engines, and fuel cells. Steam and gas turbines are the most prominent CHP in US⁷⁴ Chemical Recovery Units and account for over 50 per cent of the CHP used in the pulp and paper sector. The falling investment costs for gas turbines over the last decade have helped to boost investments in CHP although recent high gas prices could dampen this trend.⁷⁵ The steam turbine at Richards Bay was scheduled for commissioning in the fourth quarter on 2013.⁷⁶ CHP technology is known to save up to 30 per cent of primary energy compared to conventional electricity generation mechanisms.

Figure 11.2 Richards Bay gas turbine



Source: Photo supplied by Mondi

A major benefit of CHP is the simultaneous production of reliable electricity, mechanical power, and/or thermal energy.⁷⁷ The CHP systems are consistent with the mills' demand for process steam and electricity. Although many mills may import supplementary electricity from the grid, some mills are able to meet all on-site electrical power demand through self generation. Another reason why investments in CHP are attractive is its ability to sell excess power to the grid. The use of natural gas can be uncompetitive in situations where the electricity price is set by coal, nuclear, or hydropower generators. The high annual operating hours and the presence of on-site generated fuels (i.e. wood waste and black liquor) has also made CHP systems an operationally and financially attractive option for many mills in the United States.⁷⁸ The use of CHP also results in improved power quality and reliability,

greater stability in energy cost, and higher revenues from the export of excess electrical power to the grid.

Energy efficiency technologies are also among the growing list of measures adopted in the pulp and paper industry to mitigate climate change. The following are amongst other emerging energy efficiency to note: technologies for raw material preparation, chemical pulping (black liquor gasification and biomass gasification), pulp washing (steam cycle washer for unbleached pulp), secondary fibre processing, and drying section (impulse drying, gas-fired paper dryer, multi-port dryer).⁷⁹ Other promising options are coronation, BG-TAG-LAMORT process and the organocell process.⁸⁰

Important measures have been taken to install highly efficient CHP systems and replacing fossil fuels by biomass at Mondi. As of financial year end 2012, more than 58 per cent of Mondi's total primary energy consumption (globally) was based on biomass, mainly residuals from the main raw material, timber, as well as black liquor. CHP captures almost all of the by-product heat for heating purposes that are very close to the plant, or as hot water for district heating with temperatures ranging from approximately 80°C to 130°C.⁸¹ One of Mondi's plants is in South Africa and is depicted in Figure 11.3.

Figure 11.3 Richards Bay mill



Source: Photo supplied by Mondi

OTHER GREEN ECONOMY INITIATIVES

The Mondi group also has other green economy transition initiatives of note including Rotatrim, water efficiency, improving energy efficiency of processes, increasing the use of biomass-based fuels, and switching to low carbon fuels throughout the process chain. Some of the initiatives will be discussed further in the following paragraphs.

In South Africa Mondi produces Rotatrim (Figure 11.4). Rotatrim forms part of Mondi's Green Range because of its Forest Stewardship Council (FSC) Chain of Custody Certification. In July 2010, the World Wildlife Fund for Nature (WWF) published the pioneer Fine Paper Company Environmental Index. The index measures fine paper companies'

global environmental footprint, analyses the performance in responsible fibre sourcing, emissions in the manufacturing process, and transparency. Mondi was ranked first out of the invited 10 companies, of which five responded.⁸² In November 2012, Mondi received three awards: one for its contributions to the pulp and paper industry standards in sustainable paper production, efficiency, and safety by the PPI Awards, and two others from WWF in the Environmental Paper Awards for the categories 'Transparency' and 'Best Environmental Performance Paper Brands'.⁸³

Figure 11.4 Mondi's Rotatrim paper



Source: Photo supplied by Mondi

Reducing the water footprint remains a key focus area for Mondi operations. In South Africa some of the operations are located in water-stressed areas. Hence water-impact assessments providing further details were conducted in 2011.⁸⁴ Mondi's environmental strategy presses the company to ensure land and freshwater stewardship as to conserve biodiversity and ecological systems.⁸⁵ Mondi operations used up 307 million cubic metres compared to 309 million cubic metres in the 2011 reporting period. This is a reduction of 2 per cent that was achieved from recycling and improved efficiencies.⁸⁶

The group has set a target to introduce Energy Management Systems in conformity to ISO50001 standards. Mondi was hoping to achieve certification by December 2013.⁸⁷ By the time of completing this chapter, the group was already certified for ISO14001 (Environmental Management system). The use of biomass in fuel consumption at the company has risen by 11 per cent since 2004 from 47 per cent to 58 per cent.⁸⁸ The biomass is sourced from black liquor and liquid solution of residues from the Kraft process. In fact, a number of Mondi mills 'are already net exporters of green electric power generated from biomass'.⁸⁹

KEY CHALLENGES AND FUTURE GREEN ECONOMY INITIATIVES

As a developing country, South Africa still presents opportunities in terms of registering more CDM projects and financing from fossil fuel replacements. In understanding Mondi's breakthrough and future challenges, it is necessary to recap on the risks associated with transition to greener economies (some of which come in the form of barriers). Amongst the different barriers to climate mitigation are obstacles in implementing energy efficiency technologies, policy and regulatory barriers, and market related barriers. The different barriers in implementing energy efficient technologies include: lack of information about the possibilities for, and costs of, improving energy efficiency; lack of awareness of the financial or qualitative benefits arising from energy reduction measures; inadequate skills to implement such measures; capital constraints and corporate cultures that favour investment in new production capacities rather than in energy efficiency measures; preference to investment costs rather than to recurrent energy costs.⁹⁰

There are several indications that Mondi has overcome most of these energy efficiency technologies barriers. First, Mondi's corporate culture is committed to energy efficiency and saving energy. Second, the opportunities for improving energy efficiency are common knowledge. Third, it has a very good understanding of both the financial and qualitative benefits from reducing energy. Finally, it has sufficient access to the skills required.

Generally, environmental legislation connected to climate change drives the costs for energy, wood, and transport. Ineffective policy instruments may distort the market for raw materials, result in unfair global trade, and may also be a threat to the company's competitiveness within the global pulp and paper industry. One such legislation is the carbon tax discussed in chapter 2.

Since South Africa is water-stressed, the impact of climate change could increase the water shortage, thereby increasing the risk of water supply to Mondi's business. Increased pressure on available agricultural land due to the impacts of climate change is likely to result in competition for available land for the forestry and agricultural industries. Other impacts associated with climate change such as increase in temperatures, droughts, floods, fires and insect infestations may affect the forest plantations within South Africa, damaging productivity.

Customers are increasingly interested in carbon neutrality and demand climate-friendly products with a reduced carbon footprint. Since the South African economy is coal-based, the energy source for pulp and paper manufacturing operations is largely dependent on fossil fuels. Hence, carbon intensive products face a difficulty in penetrating the market of climate friendly products from the developed countries.

With regards to the policy and regulatory related barriers, there are two general dimensions worth mentioning. First, barriers related to the adoption and prioritisation of industrial energy efficiency policies and measures at national level, particularly in developing countries where there is insufficient information, skills, and methods to assess the costs and benefits of industrial energy efficiency policies and measures. Second, barriers related to the weak and inadequate fiscal and regulatory frameworks to support energy service companies, the non-economic pricing of energy, inappropriate tariff structures, and distorted market incentives that encourage energy suppliers to supply more rather than less energy. Moving into the future, one sees a situation where combined heat and power systems will grow to the point that the low grade heat is required by processes or other users.

CONCLUSION

This chapter focused on profiling how Mondi's transition to a low carbon and greener company has been enhanced through resource efficiency and combined heat and power systems. This breakthrough resulted in electrical self-sufficiency at 93 per cent, with all of the electricity generated by Mondi operations using combined heat and power technology. The chapter also discussed in depth literature addressing how the pulp and paper industry is performing globally with regards to measures aimed at addressing climate change and move towards a green economy. It emerged that the key issue in terms of the industry is energy. Mondi identified three categories associated with climate change risks and opportunities. These included those falling within the regulatory, the physical and those classified under the 'other' category.

Global climate regulatory regimes like the United National Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol were viewed as serious drivers for Mondi outside South Africa, whilst high energy costs and carbon intensive energy generated from fossil fuels in South Africa remains a challenge. Water scarcity also emerged as a key concern for the group. A number of internal policies, procedures, and institutional reforms were identified as conduits enabling Mondi's movement towards a low carbon and greener corporate. The Sustainable Development Policy is supported by sector policies covering seven key sustainable development aspects that include sustainable forestry, environmental performance, and climate change and product stewardship. Overall, the Mondi Group's green economy initiatives resulted in: having all plantations in South Africa managed sustainably and verified by the Forestry Stewardship Council

certification; fuel switch; having 33 per cent of pulp consumed globally from recovered fibre; meeting and exceeding all environmental commitments relating to waste emissions to air and water in 2010; increased use of renewable energy sources; and having water footprint data reported.

ABOUT MONDI

Mondi is an international packaging and paper Group, with production operations across 29 countries and revenues of 5,7 billion in 2011. The Group's key operations are located in central Europe, Russia, and South Africa and as at the end of 2011, the Mondi group employed 23 400 people. The Mondi group is fully integrated across the paper and packaging process, from the growing of wood and the manufacture of pulp and paper (including recycled paper), to the conversion of packaging paper into corrugated packaging, industrial bags and coatings. The Group is principally involved in the manufacture of packaging paper, converted packaging products and uncoated fine paper (UFP). The Mondi group has a dual listed company structure, with a primary listing on the JSE Limited for Mondi Limited under the ticker code MND, and a premium listing on the London Stock Exchange for Mondi plc, under the ticker code MNDI. The Group has been recognised for its sustainability through its inclusion in the FTSE4Good Global, European and UK Index Series (since 2008), and the JSE SRI Index since 2007. The Group was also included in the FTSE350 Carbon Disclosure Leadership Index for the second year.

NOTES AND REFERENCES

- 1 Mondi Group., 2012. Energy and climate change. Available at <http://sd-report.mondigroup.com/2012/downloads/MONDI-SD12-environment-03-energy-climate-change.pdf> [Accessed 4 June 2013].
- 2 Mondi Group., 2012. Energy and climate change. Available at <http://sd-report.mondigroup.com/2012/environment/energy-climate-change> [Accessed 6 June 2013].
- 3 He, D. Barr, C. and Rhee, S., 2005. China's market for pulp and recovered paper: Supply and demand trends and projections to 2010. Bogor Barat: Centre for International Forestry Research.
- 4 Department of Minerals and Energy., 2002. White paper on the promotion of renewable energy and clean energy development. Available at http://UNFCCC.int/files/meetings/seminar/application/.../sem_sup1_south_africa.pdf [Accessed 16 March 2012].
- 5 Environmental Paper Network., 2007. Social impacts of the paper industry. Available at <http://sustainability.tufts.edu/downloads/socialimpactsfactsheet.pdf> [Accessed 12 March 2012].
- 6 Lang, C., 2007. The paper industry and the business of climate change. Available at <http://chrislang.org/2007/12/20/the-paper-industry-and-the-business-of-climate-change> [Accessed 17 March 2012].
- 7 WBCSD (World Business Council on sustainable Development)., 2013. Issue Brief: Biomass Carbon Neutrality. Washington DC: WBCSD. p. 5.
- 8 CEPI (Confederation of European Paper Industries., 2011. Unfolding the Future: 2050 Roadmap to a low-carbon bio-economy. CEPI: Brussels.

- 9 Energy Efficiency Strategy of the Republic of South Africa., 2005. Department of Minerals and Energy, South African Government. Available at <http://www.iea.org/textbase/pm/?mode=pm&id=3650&action=detail> [Accessed 16 March 2012].
- 10 National Energy Act No. 34 of 2008: National Energy Act, 2008. Government Gazette South Africa.
- 11 Mondi Group., 2012. Mondi Group Integrated report and financial statements 2012. Johannesburg: Mondi Group.
- 12 Ibid.
- 13 Kramer, K. Masanet, E. and Worrell, E., 2010. Energy efficiency opportunities in the US pulp and paper industry *Energy Engineering*, 101(1).
- 14 UNIDO (United Nations Industrial Development Organisation)., 1993. Paper & pulp industry: output of a seminar on energy conservation in paper and pulp industry. Available at <http://www.unido.org/fileadmin/import/userfiles/puffk/paper.pdf> [Accessed 20 March 2012].
- 15 Pohjola, A. Zurich, I. Ingosstrakh, M. Gådin, M. and Swiss Re. F., 2006. Hazards in paper and pulp industries - from an engineering insurance perspective. Presented at the IMIA Conference in Boston, 12 September 2006. Available at http://www.epa.gov/chp/documents/biomass_chp_catalog.Pd [Accessed 15 March 2012].
- 16 Kenny, A. 2002. A background to energy in South Africa. Cape Town: Energy Research Institute, University of Cape Town.
- 17 Forestry Climate Change Working Group., 2008. Available at <http://www.bcclimatechange.ca/how-wood-products-help/pulp-and-paper-products.aspx> [Accessed 20 March 2012].
- 18 Schneider, M. Hoffmann, V. and Gurjar, B., 2009. Corporate responses to the CDM: the Indian pulp and paper industry. *Climate Policy*, (9), pp. 255–272.
- 19 Environmental Paper Network., 2009. Op Cit.
- 20 UNEP (United Nations Environment Programme)., 2007. The Millennium Development Goals Report. New York: UNEP.
- 21 McGlade, J., 2004. European packaging waste trends and the role of economic instruments. Brussels: European Environment Agency.
- 22 Stevens, E. S., 2002. Green plastics: An introduction to the new science of biodegradable plastics. Princeton: Princeton University Press.
- 23 Prasa., 2012. Paper recycling in South Africa – 2011. Johannesburg: Prasa.
- 24 Green Press Initiative., 2007. Green Press Initiative Report 2007. Available at <http://www.greenpressinitiative.org/impacts/climateimpacts.htm> and 'Greenhouse Gas Emissions in China'. Available at <http://www.ifc.org/ifcext/> [Accessed 20 March 2012]; Available at http://www.energystar.gov/ia/business/industry/downloads/Pulp_and_Paper_Energy_Guide.pdf [Accessed 17 March 2012].
- 25 Ibid.
- 26 Gavrilescu, M., 2008. Biomass power for energy and sustainable development *Environmental Engineering and Management Journal*, 7(5), pp. 617–640.
- 27 Stevens, E., 2002. Green plastics: An introduction to the new science of biodegradable plastics. Princeton: Princeton University Press.
- 28 PAMSA., 2012. Shredding the paper myths. Johannesburg: PAMSA.
- 29 Gielen, D. and Tam, C., 2006. Energy use, technologies and CO2 emissions in the pulp and Paper industry. Energy technology policy division international energy agency draft version 6/10/, Discussion Paper prepared for the IEA workshop.
- 30 Pohjola, A. Zurich, I. Ingosstrakh, M. Gådin, M. and Swiss Re. F., 2006. Hazards in paper and pulp industries – from an engineering insurance perspective. Presented at the IMIA Conference in Boston,

- 12 September 2006. Available at http://www.epa.gov/chp/documents/biomass_chp_catalog.pdf [Accessed 15 March 2012].
- 31 European Paper & Packaging Industries. 2012. Combating Climate Change. Available at <http://www.paperonline.org/environment/combating-climate-change> [Accessed 16 March 2012].
- 32 Schneider, M. Hoffmann, V. Gurjar, B., 2009. Corporate responses to the CDM. *The Indian pulp and paper industry Climate Policy*, (9), pp. 255–272.
- 33 Among these authors is included the South African Department of Mineral and Energy (2002); Kramer, K. Masanet, E. and Worrell, E., 2010. Energy efficiency opportunities in the US pulp and paper industry. *Energy Engineering*, 101(1); IPCC (Intergovernmental Panel on Climate Change), 2007. Climate Change Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Bonn: IPCC; and US EPA (US Environmental Protection Agency), 2010. Available and emerging technologies for reducing Greenhouse Gas Emissions from the pulp and paper manufacturing industry. Available at <http://www.epa.gov/nsr/ghgdocs/pulpandpaper.pdf> [accessed 16 March 2012].
- 34 Karlsson, R., 2009. Anaerobic digestion of biological sludge from the pulp and paper industry. University essay from Linköpings University. Available at <http://www.essays.se/essays/b8de89b984> [Accessed 20 March 2012].
- 35 Mohanty, B., 1997. Technology, Energy Efficiency and Environmental Externalities in the Pulp and Paper Industry. Bangkok: Asia Institute of Technology.
- 36 Ibid.
- 37 USEPA (US Environmental Protection Agency Combined Heat and Power Partnership), 2007. United States Biomass Combined Heat and Power Catalogue of Technologies. Available at http://www.epa.gov/chp/documents/biomass_chp_catalog.pdf [Accessed 18 March 2012].
- 38 Gavrilescu, M., 2008. Op Cit.
- 39 USEPA (US Environmental Protection Agency Combined Heat and Power Partnership), 2007. United States Biomass Combined Heat and Power Catalogue of Technologies. Available at http://www.epa.gov/chp/documents/biomass_chp_catalog.pdf [Accessed 18 March 2012].
- 40 Popa, I. and Volf, I., 2008. Contribution to the complex processing of biomass. Proceedings of the 2008 Nordic Wood Biorefinery Conference - Stockholm, 229.
- 41 Worrell, E. and Bernstein, L. Roy, J. Price, L. and Harnisch, J., 2009. Industrial energy efficiency and climate change mitigation. *Energy Efficiency*, 2(2), pp. 109–123.
- 42 Cardell, L., 2010. Anaerobic digestion of pre-treated biological sludge from pulp and paper industry using heat, alkali and electroporation. Linköpings universitet, Inst. för Tema, Avd. för Vatten i natur och samhälle. 581 83 Linköping. Available at <http://liu.diva-portal.org/smash/get/diva2:393340/FULLTEXT01> [Accessed 20 March 2012].
- 43 See www.afandpa.org/WorkArea/DownloadAsset.aspx?id=918 [Accessed 1 January 2013].
- 44 Arthur, R. Baidoo, M. and Antwi, E. 2011. Biogas as a potential renewable energy source. *Renewable Energy*, (36), pp. 1510–1516.
- 45 See www.etcpitea.se/blg/document/PBLG_or_RB.pdf [Accessed 1 January 2013].
- 46 Ibid.
- 47 USEPA., 2010. Op Cit.
- 48 Caffal, C., 1995. Energy management in industry. Centre for the Analysis and Dissemination of Demonstrated Energy Technologies (CADET). Analysis Series 17. Sittard.
- 49 USEPA., 2010. Op Cit.
- 50 Mondi Group., 2011. Energy and climate change. Johannesburg: Mondi Group.

- 51 UNFCCC., 1997. Kyoto Protocol. Bonn: UNFCCC secretariat.
- 52 NBI (National Business Initiative)., 2009. Carbon Disclosure Project 2009 South Africa JSE 100. Johannesburg: NBI & Incite Sustainability.
- 53 NBI (National Business Initiative)., 2010. CDP Water Disclosure 2010 South Africa Focus. Johannesburg: NBI & Incite Sustainability.
- 54 Mondi Group., 2011. Op Cit.
- 55 TIPS (Trade and Industrial Policy Strategies)., 2009. Climate Change Risks and Opportunities for the South African Economy: Economic Sector Review: Wood and Paper Products (Printing, Publishing and Recorded Media). Pretoria: TIPS.
- 56 Mondi Group., 2012. Op Cit.
- 57 Nhamo, G., 2009. Climate Change: Double Edged Sword for African Trade and Development. *International Journal of African Renaissance*, 4(2), pp. 117–139.
- 58 Emphasis is ours.
- 59 Mondi Group., 2010. Mondi Group sustainable development review 2010: Taking stock of our sustainability footprint. Johannesburg: Mondi Group.
- 60 Mondi Group., 2010. Sustainable development Policy and Sector Policies. Johannesburg: Mondi Group.
- 61 Mondi Group., 2010. Environment Policy. Johannesburg: Mondi Group.
- 62 Mondi Group., 2010. Climate Change Policy. Johannesburg: Mondi Group.
- 63 Mondi Group., 2010. Product stewardship Policy. Johannesburg: Mondi Group.
- 64 Mondi Group., 2012. Mondi Group sustainable development report 2012. Johannesburg: Mondi Group.
- 65 Mondi Group., 2012. Op Cit.
- 66 Mondi Group., 2010. Mondi Group sustainable development review 2010.
- 67 Mondi Group., 2011. Accountability for sustainability.
- 68 Mondi Group., 2010. Mondi Group sustainable development review 2010.
- 69 Mondi Group., 2012. Op Cit. p. 1.
- 70 Mondi Group., 2011. Energy and climate change.
- 71 See www.ftp.fao.org/docrep/fao/009/j945e26.pft [Accessed 1 January 2013].
- 72 Minett, S. and Mensink, M., 2006. Pulp and paper industry combined heat and power (CHP) in Europe Managing Director Energy & Environment Director COGEN Europe Confederation of European Paper Industries. (CEPI). Available at <http://ftp.fao.org/docrep/fao/009/j9425e/j9425e26.pdf> [Accessed 19 March 2012].
- 73 USEPA., 2007. US Environmental Protection Agency Combined Heat and Power Partnership September. Available at http://www.epa.gov/chp/documents/biomass_chp_catalog.pdf [Accessed 12 March 2012].
- 74 USEPA., 2010; US. EPA (US Environmental Protection Agency Combined Heat and Power Partnership). 2005. Biomass CHP. Available at <http://www.epa.gov/chp/basic/renewable.html> [Accessed 15 March 2010].
- 75 Minett, S. and Mensink, M., 2006. Op Cit.
- 76 Mondi Group., 2012. Op Cit.
- 77 USEPA., 2007. US Environmental Protection Agency Combined Heat and Power Partnership September. Available at http://www.epa.gov/chp/documents/biomass_chp_catalog.pdf [Accessed 12 March 2012].
- 78 USEPA., 2010. Op Cit.

- 79 Kramer, K. Masanet, E. and Worrell, E., 2009. Energy efficiency improvement and cost saving opportunities for the pulp and Paper industry. Report No. LBNL-2268E, Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, CA.
- 80 Mohanty, B., 1997. Op Cit.
- 81 Mondi Group., 2012. Op Cit.
- 82 Mondi Group., 2011. Awards and recognition. Johannesburg: Mondi Group.
- 83 Mondi Group., 2012. Press Release: Major wins for Mondi with three awards from PPI and two from WWF. Johannesburg: Mondi Group.
- 84 Mondi Group., 2011. Cleaner production. Available at <http://www.mondigroup.com/desktopdefault.aspx/tabid-1343/> [Accessed 15 March 2012].
- 85 Ibid.
- 86 Ibid.
- 87 Mondi Group., 2012. Op Cit.
- 88 Ibid.
- 89 Ibid.
- 90 Monari, L., 2008. Energy Efficiency in Industry: Experience and Opportunities for Mondi. <http://www.mondigroup.com/desktopdefault.aspx/tabid-1343/> [Accessed 25 March 2012].

Energy self-sufficiency for sustainably managed forestry and manufacturing operations at Sappi

Memory Tekere

ABSTRACT

Sappi is one of the major world players in the pulp and paper industry. In its endeavour to reduce greenhouse gas emissions (GHG) and mitigate climate change, Sappi has put in place measures to reduce GHG emissions and increase renewable energy uses through streamlined transport systems, production process changes, installation of more efficient equipment, reduction in purchased energy, and increased use of bio-fuel. To this effect, a significant reduction in the carbon dioxide emissions per tonne of product produced has been achieved since 2005 to date. Sappi derives 38,1 per cent and 31,8 per cent of energy for South Africa operations and Europe respectively from renewable energy sources. The group's global figure stood at 48,6 per cent in 2010. Energy as an input is the major cost for the pulp and paper industry. Energy costs for Sappi ranged from US\$558 in 2008, US\$584 in 2009, and US\$626 per tonne in 2010. It is against this backdrop in rising energy costs that Sappi decided to strive towards energy self-sufficiency and move towards producing its own bio-fuels since the energy it purchases is mostly from carbon sources. Reducing the carbon footprint through improving energy use efficiency and decreasing reliance on fossil fuels has been identified as one of the key strategic goals for Sappi. The enablers for Sappi's migration to renewable energy include its re-orientation of internal policy framework, institutional and human resources. Among the drivers to Sappi's migrating to low carbon and green economy are: cost of carbon taxes, energy supply risk, energy opportunities, and lastly reputational and marketing opportunities.

INTRODUCTION

What we do about climate change today has far reaching consequences for the sustainability of businesses, communities and ultimately the world we depend upon for existence (Ralph Boettger, Chief Executive Officer of Sappi Limited).¹

Power generation from renewable energy makes both environmental and economic sense and this is the path that Sappi has chosen. Although renewable energy self-sufficiency for sustainably managed forestry and manufacturing operations at Sappi will be profiled as the breakthrough, readers should note that the company has started several initiatives as it migrates towards a greener and low carbon economy. Among such initiatives GHG measurement, the development of a carbon foot print calculator and good management of forests feature prominently.

Faced with the biggest prevailing environmental crisis – climate change – companies have to place themselves strategically to meet the quest for sustainable development and market competitiveness. In the Carbon Disclosure Project South Africa report of 2007,² the then Minister of Environmental Affairs clearly stated that ‘global warming is “unequivocal” and “almost without doubt” man-made and as such requires attention and action from all sectors of the economy’.³ A low carbon economy is therefore among many initiatives and inevitable choices that could be harnessed to tackle global warming and achieve sustainable development.⁴ Major efforts to reduce GHG emissions are needed if long term increases in temperatures are to be curbed.⁵

Sappi was founded in 1936 as a pulp and paper company and is the world leading producer of coated fine paper.⁶ The group has significant businesses in pulp, packaging, and uncoated fine paper. Sappi forest products, the forests, pulp, packaging, and newsprint business based in South Africa is the largest producer of chemical cellulose used in the manufacture of viscose staple fibre and consumer and pharmaceutical products.⁷ Sappi’s headquarters is in Johannesburg, South Africa, and is listed on the Johannesburg stock exchange (SAP), the New York Stock exchange (SPP), and the London Stock Exchange (SAZ).⁸ Sappi, together with Mondi, are the two main players in the pulp and paper industry and were reported as the key carbon emitters in South Africa. The companies’ emissions levels stood at 6,9 and 6,0 million tonnes respectively in 2009.⁹

The major current environmental issues for the pulp and paper industry can be considered as sustainable forestry, energy and green house emissions, and responsible use of recycled fibre.¹⁰ Carbon dioxide (CO₂) from energy related emissions has been cited as a major concern in climate change debates.¹¹ High energy demand is one of the challenges facing the pulp and paper industry in relationship to climate change. In the United States, the pulp and paper industry ranks third as the largest industrial energy user.¹² The pulp and paper industry is energy intensive, requiring at least 5-17G of process heat to produce one tonne of paper depending on the production process and the paper quality.¹³

BUSINESS CASE FOR TRANSITION TO A LOW CARBON COMPANY

In its sustainability report of 2010,¹⁴ Sappi states that there is no solution to climate change without responsible commercial forestry. The Chief Executive Officer (CEO) of Sappi, Ralph Boettger, echoed in this report that Sappi always welcomes the opportunity

to become involved in global interventions focusing on the transition to low carbon. Energy is a case in point in Sappi's quest for sustainable development. Sappi's operations are energy intensive and as such, a long term strategic plan involves the reduction of GHGs and a concerted focus on the use of renewable and self-generated energy. Sappi's ability to generate its own energy is important economically and from an environmental perspective. Renewable energy sources for Sappi are from black liquor, bark and sludge. Black liquor is the spent cooking liquor from the Kraft process which results when pulpwood is digested into paper pulp by removing lignin, hemicelluloses and other extractives from the wood to free the cellulose fibres. The resulting black liquor is an aqueous solution of lignin residues, hemicelluloses, and the inorganic chemicals used in the process. It contains more than half of the energy content of wood fed into the digester. The drivers for Sappi's transition to a low carbon company through the use of renewable energy can be described as influenced by: energy supply cost – cost of carbon taxes related to fossil fuel usage; energy supply risk; energy opportunities; as well as reputational and marketing opportunities. These drivers will now be each discussed briefly in the following sections.

ENERGY SUPPLY COST

Together with wood, pulp, and chemicals, energy is one of Sappi's principal supply requirements. Sappi operations are energy intensive with energy input costs for the company increasing steadily with global energy costs rising to more than double for the period 2004 to 2009, as shown in Table 12.1. In the 2010 fiscal year, electricity purchased from Eskom, in South Africa, amounted to approximately 17 per cent of the variable costs of the South African operations as compared to 13 per cent in the fiscal year 2009.¹⁶ Against this backdrop of rising input costs it makes economic sense to aggressively seek to reduce energy costs, for example by pursuing ways to increase use of own renewable fuel. Table 12.1 shows the rising energy cost for Sappi for the period 2004 to 2009.

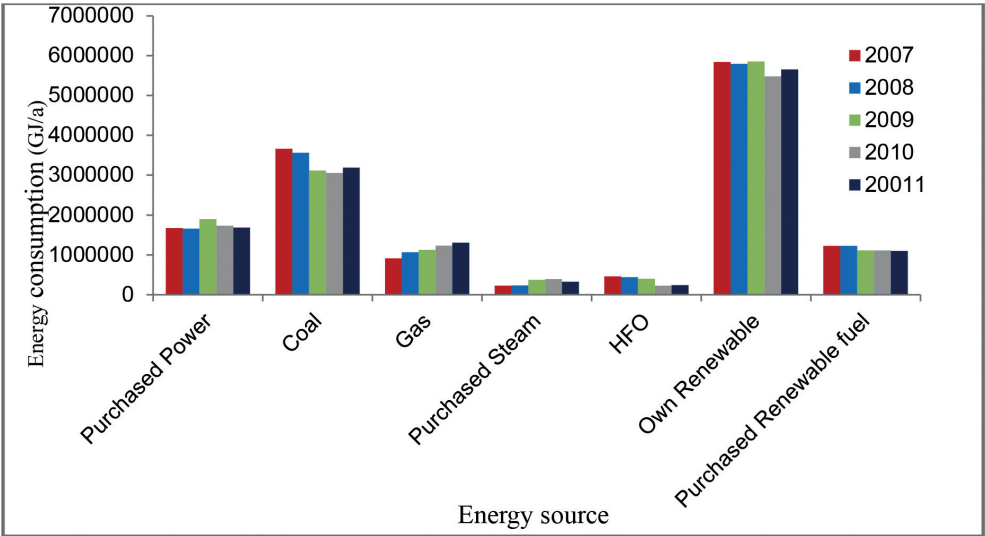
Table 12.1 Energy costs for Sappi for the period 2004 to 2009.

Cost item	2004	2005	2006	2007	2008	2009
Energy Costs (energy attributable to mill) (\$ m)	308,14	345,50	414,68	427,47	538,55	618,99
Operating costs (cost of sales) (\$ bn)	4 027	4 507	4 419	4 591	5 131	5 303
Energy costs as a percentage of cost of sales	7,65	7,67	9,38	9,31	11,00	11,67

Source: Author

Energy use for the group is shown in Figure 12.1 and as indicated, the use of own renewable energy is high (EN-3 refers to the G3 Global Reporting Initiative (GRI) indicators against which reporting is done). In North America, the amount of all energy obtained from renewable sources such as black liquor, bark, sludge, and purchased biomass is 88 per cent (industry average: 64 per cent), and the percentage of energy derived from renewable resources for South Africa is 45 per cent. In the southern African region Sappi sets the industry average and for Europe it is 34,0 per cent (industry average is 52 per cent), with Sappi's global figure standing at 49 per cent. The reason for the much higher percentages of renewable energy in Sappi's mills in North America and South Africa than in Europe is that a much greater proportion of the product originates from Kraft type integrated pulp and paper mills. These mills typically have a higher degree of energy self-sufficiency than mills with different processes or those that only produce paper, as the black liquor (dissolved organic compounds from wood) created during the manufacture of pulp is a bio-fuel and a primary source of renewable fuel for steam and power production. However, combined heat and power (CHP) plants, which are more efficient than conventional electricity and heat generation systems, are operated at some of the mills in Europe. Renewable energy from the production of biogas in the anaerobic digestion of sludge is also used in some of the European mills.

Figure 12.1 EN-3 direct energy consumption by primary energy source



COST OF CARBON TAXES RELATED TO FOSSIL FUEL USAGE

Policy interventions aimed at strengthening energy security and mitigation of global climate change are likely to increase in the future. In each region where Sappi operates, i.e. Europe, North America, and South Africa, there is likelihood of a carbon tax, which are still yet to be determined. The high percentage of energy that Sappi derives from renewable sources will cushion the company from the negative effects of future possible regulatory requirements and carbon tax legislation and will also create opportunities in the form of tax and trading credits. In South Africa it was proposed that a carbon tax will be implemented in 2013/2014 at a rate of R120 per tonne of carbon dioxide equivalent (CO₂e) on direct emissions and will increase by 10 per cent annually until 2020. The proposed carbon tax for South Africa is very onerous because the factors that are proposed will increase the cost of fossil fuel and power by between 100 and 200 per cent for South African operations. In addition, the levy on electricity generated from non-renewable sources in South Africa would increase by 1c/kWh as from 1 July 2012. Since the South African operations have a high dependence on fossil energy (Eskom power is 95,8 per cent fossil-fuel based) and the predominant purchased fuel is coal, the net effect of this can put a number, if not all, of the operations into a loss-making situation. This makes the quest for energy self-sufficiency and migration to renewable energy a case in point for Sappi.

ENERGY SUPPLY RISK

In other regions where Sappi operates, there is the likelihood that there could be some energy supply risks. For example, while South Africa has not experienced load-shedding since April, 2008, the government and Eskom warned that the country was at risk of yet another electricity crisis, should the demand pick up before the first unit of Eskom's Medupi power station came on stream in 2012. Generating own energy therefore offers some security in case of supply risk. Sappi South Africa is at a 45 per cent energy self-sufficiency, thus offering some protection to its operations against this risk, and motivating them to further increase their energy self-sufficiency through migration to renewable energy.

ENERGY OPPORTUNITIES

Globally there is high advocacy towards migration to renewable energy and as energy demand increases elsewhere, there are opportunities to sell energy to the national grids or other industries. Because woody biomass, which forms part of the pulp and paper industrial input, can produce alternative transportation fuels and low carbon electricity, the pulp and paper industry sees opportunities in relationship to energy. The pulp and paper industry is better placed for bio-energy and bio-fuels production since they already

have the operating infrastructure to produce large quantities of bio-fuels without the need to add any new fibre processing capacity. Sappi is thus currently examining bio-fuel opportunities in all regions where it operates. In South Africa, Sappi is selling the bio-fuel generated from Saiccor Mill and Ngodwana Mill to Eskom since October 2010 and January 2011 respectively.

REPUTATIONAL AND MARKETING OPPORTUNITIES

The world is becoming increasingly focused on the environmental credentials of products. Consumers are more environmentally aware and since 2007, many retailers have asked suppliers to fill in sustainability scorecards. The extent to which renewable energy is used throughout Sappi's operations is a strong marketing tool, and hence offering an opportunity for Sappi's products. Consequently, the following facts present distinct reputational and marketing opportunities for Sappi:

- They manufacture a recyclable product produced from a renewable resource grown in sustainably managed forests (North America and Europe) and plantations (South Africa);
- Through carbon sequestration, their sustainably managed forests and plantations play an important role in mitigating the impacts of climate change. This was echoed in a statement from the Forests Dialogue, Yale University, September 2008: 'Of all the options in response to climate change, forest-related mitigation measures are, in the short to medium term, among the most practicable and cost-effective'.
- Sappi forests and products have high levels of internationally accredited certification [Program for the endorsement of Forest certification (PEFC), Sustainable forestry Initiative (SFI®), Forest Stewardship Council (FSC), and Eco-Management and Audit Scheme (EMAS)]. Globally, approximately 75% of the fibre procured by Sappi is certified, with the rest being procured from known and controlled sources. Sappi does not source their raw materials from old-growth or endangered forests anywhere in the world. In South Africa, Sappi's lands are 100% FSC certified and are also ISO 14001 certified. In this region, 82% of the fibre procured is certified.

The Sappi range of paper is almost 100 per cent recyclable (wet strength papers being an exception) and bio-degradable rather than photo-degradable, as is the case with most plastics. In South Africa, Sappi has established an internationally recognised, credible carbon footprint methodology, which allows customers and consumers to make more informed choices.

ENABLERS FOR MIGRATION TO RENEWABLE ENERGY

The enablers for Sappi's migration to renewable energy are informed by its internal policy framework, institutional and human resources. Likewise these enablers will each be discussed further in the following sections.

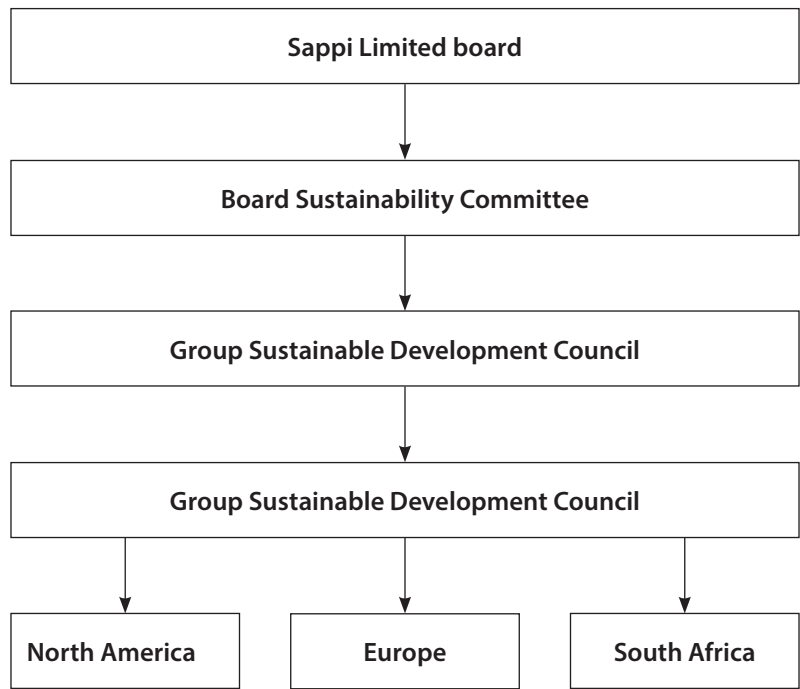
SAPPI'S INTERNAL POLICY FRAMEWORKS AND CORPORATE STRATEGY

Sappi's sustainability vision is to embed the 3Ps of Prosperity, People, and Planet into everyday business processes. This is so in order to add value to all stakeholders and to help achieve the goal to be the most profitable company in paper, pulp, and chemical cellulose solutions on a sustainable basis. In 2005, Sappi formulated a sustainability charter based on the principles of the 3Ps. Drawing from the charter, Sappi has reported its sustainability performance and commitments in terms of each P since 2008. The mission statement for Sappi fulfils the aspiration on delivering on sustainability by:

- focusing on ethical performance in keeping with the values of Excellence, Integrity, and Respect
- generating Prosperity as the ability to remain a sustainable player is founded on generating profits in the short and long term
- improving the lives of People through products and services that enrich their lives and by providing an environment in which they can develop their full potential
- Treading more lightly on the Planet by balancing needs with impact on the earth.

In 2008, Sappi established Regional Sustainable Development councils which report to the Global Sustainable Development Council. This body in turn reports to the Board Sustainability Committee (previously an Executive Committee). A key development in 2008 was the elevation of the executive sustainability committee into a board committee, which continues to be chaired by an independent non-executive director and the committee agrees on sustainability objectives and monitors targets quarterly. The reporting structure for sustainability aspects is shown in Figure 12.2.

Figure 12.2 Organogram showing the reporting structure of the different sustainable committees and councils



Source: Author¹⁷

In addition to the structure in Figure 12.2, there are a number of internal ‘clusters’ comprised of experts in various fields. These clusters are tasked with establishing best practice across a broad variety of disciplines, as well as driving and monitoring performance.¹⁸ The clusters examine areas such as wood supply issues, disease, fires and bio-fuel related risks, taxation-based risks which will affect the industry even though Sappi is largely bio-fuel based, access to raw materials and maintenance of operations due to shortages of natural resources such as water. The clusters also evaluate the opportunity to produce bio-based products, the opportunity to increase biomass based energy, the opportunity to produce lighter weight products which will meet customers’ needs to reduce their carbon footprint, and the opportunity to work with customers to create more environmentally friendly products. The members of these clusters and their counterparts at Sappi’s Technology Centres around the world, as well as the risk management staff, continuously gather information on various macro trends, business trends, technology, and technology trends from a variety of external and internal sources.

Various trend concepts are constantly identified and then organised into key bundles. At the time of the risk assessments, these bundles are screened for the potential disruptive effect on the group (in terms of both risk and opportunity) and are plotted on a series of matrices. These matrices are then reviewed quarterly and the most critical risks

and opportunities in terms of timeframe, impact, and the group's own level of existing interventions are identified and listed. The Global Technical Management Team (GTMT) includes the Group Head: Technology who prepares a quarterly paper for the Board that reflects the work done in these clusters.

The Bio-refining Cluster, and the Energy, Emissions and Effluent Cluster are of major relevance to climate change and renewable energy use issues for Sappi. The Bio-refining Cluster brings together scientists on a global basis to specifically identify opportunities in bio-based chemicals and energy as they relate to the businesses, and report to the GTMT on these areas. The Energy, Emissions and Effluent Cluster, established in 2000, measures GHG emissions, as well as energy use and energy cost, together with other key environmental parameters (gaseous emissions, solid waste, water), based on the premise of 'measure, monitor, manage and mitigate' – pre-empting current regulatory trends by many years.¹⁹ The impetus for this came about from rising energy prices, interest in global warming, increasing the use of renewable energy, reduction in emissions, and effluent content. The parameters are now used as management key performance indices.²⁰

In South Africa in 2011, Sappi established an energy platform comprised of energy experts from each of their operations; the task of this platform being to identify energy savings in each operation with a view to complying with the commitment set out in the Sustainability Charter 'to reduce greenhouse gas emissions and increase the use of renewable energy' and meet the target of reducing the use of fossil fuel emissions by 15 per cent by 2015.²¹

INSTITUTIONAL AND HUMAN CAPACITY DEVELOPMENT

With regards to institutional development, innovation is an important part of remaining a viable business in a fast-changing world. In focusing on innovation, Sappi's main objective is to ensure that their business stays relevant for stakeholders through appropriate technology, ongoing product development, as well as listening to the customers' needs. Research and development takes place at technology centres in North America, Europe, and South Africa, which all have their own specific areas of expertise. To this effect, continued innovation and research on reducing greenhouse gas emissions, energy efficiency, energy co-generation, and increase in the use of renewable energy is ongoing at Sappi technology centres.

As for human capacity development, Sappi recognises that there is a direct link between people and sustained business performance.²² Global training spending has increased steadily and in 2010 was at US\$9,8 million and US\$9,1 million in 2009, while the number of employees was 15,600 in 2010 and 16,400 in 2009. In terms of sustainability, Sappi pioneered a sustainability ambassador programme in North America of which individuals from a broad range of disciplines within Sappi are tasked with spreading knowledge and understanding of Sappi's sustainability strategy and performance to customers

and other stakeholders. The ambassador programme has now been extended to South Africa and Europe.

In terms of external human capacity development, Sappi's support to the communities is focused on prioritised cultural, environmental, and educational projects. Donations to charity are geared towards cancer, HIV/AIDS, and tuberculosis which are issues of importance to staff. The majority of Sappi's corporate social responsibility (CSR) spending takes place in South Africa, given the development needs of the country.²³ The total CSR spend in 2010 amounted to 3,2 per cent of profit after tax. The majority of funding with respect to the environment is currently being used to address environmental and wildlife conservation, education, preservation, and rehabilitation programs.²⁴

ENERGY SELF-SUFFICIENCY THROUGH RENEWABLE ENERGY USE

The pulp and paper industry is well placed with respect to the production of significant amounts of bio-fuel and bio-energy.²⁵ The pulp and paper industry has access to a large amount of forestry and agricultural biomass and the infrastructure already exists such that these can be re-aligned to the co-production of bio-energy.

As a renewable resource company, Sappi is committed to a global climate change solution focused on making the transition to a low carbon and greener economy.²⁶ Transition to renewable energy sources and a move towards energy self-sufficiency is at the core of Sappi's quest for sustainable development and mitigating climate change. Sappi aims at becoming fully energy self-sufficient, reduce purchased energy, increase use of renewable energy (an approach which ultimately results in a reduction in GHG emissions thereby increasing business viability and returns to shareholders), as well as the potential for generating additional revenue.

Purchased biomass, black liquor, sludge, and bark are the primary renewable energy sources for Sappi. During the pulp and paper manufacturing process, carbon dioxide CO₂ is produced from the consumption of coal, gas and oil, as well as a range of renewable fuels such as black liquor and combustible sludge, whether this results in the production of steam, heat or electricity. Incineration of wood fuels can be considered carbon neutral as long as the wood is derived from sustainably managed forests. Electricity generation in countries where Sappi operates is partially based on the consumption of fossil fuel and this gives rise to obvious carbon implications. However, this is balanced by the high percentage of renewable energy used in Sappi's mills.

Global power self-sufficiency for Sappi stood at 60,84 per cent in 2011. In North America, more than 83 per cent (industry average: 64 per cent) of all energy used is derived from renewable resources (black liquor, bark, sludge and purchased biomass).²⁷ The percentage of energy derived from renewable resources for South Africa is 45 per cent (in this region, Sappi sets the industry average) and for Europe is 34 per cent (industry average: 52 per cent).²⁸ The figure for South Africa is expected to increase to over

50 per cent once the Amakhulu expansion project, at the Sappi Saiccor Mill, is fully on stream. In 2009, the Amakhulu project won an award from Africa Energy for 'The Most Innovative Co-generation Project' for its \$4,3 million CDM (Clean Development Mechanism) project, converting a boiler from coal to bark and thus, reducing its use of coal by 53 000 tonnes per year, an award also won by Sappi's Tugela Mill in 2008.²⁹ In the European Union (EU), the company generates biogas from non-aerobic digestion of sludge.

The reason for the much higher percentages of renewable energy in Sappi's mills in North America and South Africa than in Europe is that a much greater proportion of the product originates from Kraft type integrated pulp and paper mills. These mills typically have a higher degree of energy self-sufficiency than mills with different processes, or those that only produce paper, as the black liquor (dissolved organic compounds from wood) produced during the production of pulp is a bio-fuel and a primary source of renewable fuel for steam and power production. However, in Europe combined CHP plants are in operation at some of the mills, a process which is more efficient than conventional electricity and heat generation systems. Also, in addition to renewable energy from the production of black liquor, biogas is produced from anaerobic digestion in some of the European mills.

Reducing GHGs in manufacturing operations has been the driving force behind the move towards energy self-sufficiency and decreased reliance on fossil fuels energy. As far back as the year 2000, Sappi instituted a system for measuring GHGs, based on the premise of 'measure, monitor, manage and mitigate'.³⁰ Since then, reducing the carbon footprint through improved energy-use efficiency and decreased reliance on fossil fuels energy – an approach which ultimately results in a reduction in GHG emissions, became one of their key strategic goals. This has been achieved through: greater use of renewable fuels in boilers; upgrading of boilers to maximise energy generated from renewable fuels; increasing the energy efficiency of operations; increasing recycling of water as this retains heat within operations and reduces fossil fuel consumption; and investigating further potential CDM projects under the Kyoto Protocol for the South African operations.³¹

An example of this approach was the expansion project at the chemical cellulose plant at Saiccor Mill which increased chemical cellulose capacity by 200 000tpa while reducing the mill's dependence on fossil fuels by 20 per cent coal, and on the national power grid by a further 20 per cent.³² The project converted a boiler from coal to bark and thus reducing its use of coal by 53 000 tonnes per year.³³

Figure 12.3 Power self-sufficiency for Sappi in the different regions

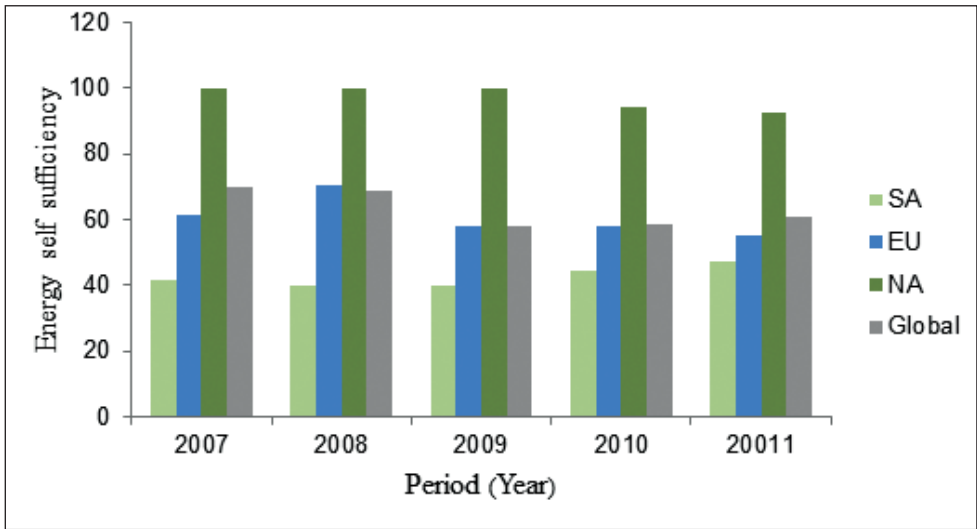


Figure 12.3 shows the energy self-sufficiency (%) for Sappi in the different regions it operates (NA represents North America). The high percentage for Sappi’s North American mills, as compared to South Africa, is due to the fact that the production in this area is mostly the Kraft process, which generally produces more power. Of the eight mills in South Africa, three are Kraft, and at one of these not all the available black liquor residue is extracted for use as heat gain. This explains the lower percentage of self-generated power for the region. In Europe, the position is different. Because of the high cost of power in this region, it is economically viable for the mills to generate as much of their own power as possible. They do this by purchasing gas to run gas turbines which then generate power as well as boiler heat (co-generation).³⁴

OTHER LOW CARBON INITIATIVES

Though renewable energy use features as the main breakthrough in transition to a low carbon Sappi, it should be noted that the company has several other initiatives towards low carbon and green economy amongst which the following feature prominently: GHG measurement and the development of carbon foot print calculator, reducing carbon footprint through green information technology and good management of forests. Some of the key aspects addressed through these initiatives are outlined in the next sections.

DEVELOPMENT OF A CARBON FOOT PRINT CALCULATOR

In the absence of a standard carbon footprint methodology for the forest products industry, Sappi's challenge has been on finding an internationally recognised, technologically sound and transparent methodology in order to provide stakeholders with credible information regarding the carbon footprint of the mills and products. It still remains unclear what global standard will emerge as most relevant to customers worldwide. In South Africa, Sappi uses the Forestry Industry Carbon Assessment Tool (FICAT).³⁵ This comprehensive methodology was co-developed by the National Council for Air and Stream Improvement (NCASI) and the Confederation for European Paper Industries (CEPI),³⁶ the CEPI 'Ten Toes' approach is utilised to provide scope 1, 2 and 3 GHG information.³⁷ Carbon footprints for the South African operations have been completed and the carbon footprints for products manufactured in these regions were completed in 2011. Having clarity on the carbon footprint, offers the stakeholders with credible information and an opportunity to enhance the company's reputation. Sappi's products are inherently renewable and sustainable, thus assessing the carbon footprint across the supply chain will help to entrench this fact with all stakeholders. The intention is to seek input from stakeholders regarding these various standards.

MITIGATING GHGS THROUGH RESPONSIBLE FORESTRY

Forests which are properly managed play a significant role in mitigating climate change through increasing forest carbon stocks and sustained annual yield of timber, fibre and/or energy.³⁸ Pulp and paper industries have the unique advantage in that the primary raw material is wood fibre, a renewable, recyclable resource. Sustainably managed forests and plantations sequester carbon, and thus play an important role in helping to mitigate climate change. The tree improvement programmes for Sappi are the cornerstone of their approach to sustainable forestry for they ensure that they get more from each tree over a 15-year period. Sappi has increased the fibre yield of eucalyptus plantations by 60 per cent; breeding for specific pulping characteristics which reduces wastage and breeding for disease resistance. There is also ongoing research, including collaboration with industry and various research institutes to improve civil-cultural practice, develop bio-control measures, and breed genetically more resistant planting stock.³⁹ In collaboration with the University of Pretoria, South Africa, Sappi's tree breeders at the Tweedie Research Centre developed a reliable Designated National Authority (DNA) fingerprinting tool to improve breeding efficiency, and this project was the regional winner of the annual Technology Innovation Awards (TIA) awards.⁴⁰

ENERGY CO-GENERATION OPPORTUNITIES

Co-generation is the practice of using exhaust heat from gas turbine electrical generators for producing heat (mostly steam) in manufacturing processes. The forest products industry is a leader in production and use of co-generated electricity, with paper mills using electricity to power equipment and steam to make products.⁴¹ Steam is also used to heat dryers used in the paper-making process. An added benefit is that the substantially higher efficiency levels of co-generation plants significantly reduce the specific emission levels of GHGs. Gas turbine electrical generators alone have efficiencies in the 30-35 per cent range. If co-generation is used the efficiency increases to around 60 per cent.⁴²

In South Africa, Sappi is looking at the following energy co-generation opportunities:

- A project at Lomati sawmill to use waste wood (currently 47 000 tonnes) for co-generation and condensing power
- A combined cycle gas turbine at Tugela Mill which would ultimately result in the mill being independent of Eskom
- The utilisation of bark as a fuel for a new cogeneration project at Saiccor Mill to generate more steam and electrical power, making the mill less dependent on coal and more energy self-sufficient.

It is important to note that opportunities are being considered at both broad-scale and smaller-scale. Smaller-scale opportunities being explored include using fibre sludge at Tugela Mill in South Africa to produce a long-burning carbonised briquette, capable of burning for up to eight hours. Plant trials have proved extremely successful and the briquettes could prove to be extremely beneficial to the informal market in particular. Currently, an estimated four million South African households still rely on unprocessed fuels such as coal and firewood and, in addition, a significant percentage of households rely on paraffin for cooking, heating, and lighting. It is estimated that 80 000 families are affected each year by paraffin-related death, burns, and poisonings.

The benefits of this project will include: enhanced revenue, minimisation of a waste stream (fibre sludge) which otherwise goes to landfill (diverting the waste stream helps to minimise the methane emissions associated with landfill), reduced GHG emissions by lower income households and the health benefits associated with the elimination of GHGs, and reduced use of paraffin. Fibre sludge is being considered for use as a medium for seedlings – once again, diversion of this waste stream from landfill could help reduce methane emissions.

REDUCING CARBON FOOTPRINT THROUGH GREEN INFORMATION TECHNOLOGY

Recognising that the IT industry accounts for 2 per cent of global CO₂ emissions, Sappi's IT department has focused on reducing the group's carbon footprint through IT. This is being achieved through four mechanisms and channels, namely:

- *Facilitating collaboration among geographically disparate parts of the organisation:* This has witnessed the use of tele-conferencing solutions throughout Sappi's regions. In Europe alone, it's estimated that this initiative saves approximately 4 000 air flights annually, resulting in savings of 2 million Euro. An extension of this philosophy is tele-working, where employees no longer commute to work on a regular basis. IT provides remote access to Sappi's network resources contributing to a yearly reduction of 3,2 metric tons of CO₂.
- *Virtualisation and consolidation:* Instead of having one physical server for each application, multiple applications on one physical server have been implemented. Reducing hardware and energy demands started in 2005 and the process is now 80% complete. This has resulted in the eradication of more than 500 servers. The significance of this is indicated by the fact that eradicating just one server saves 7 000 kWh of electricity and 4 tonnes of CO₂ emissions.
- *Optimising energy usage:* Reducing central processing unit clock frequency outside normal business hours slows down the server processing speed and results in an estimated power saving of between 20 to 30%. Sappi also ensures that personal computers are set on 'hibernate mode' during non-business hours; and switching to more energy efficient servers, and thus reduced energy usage by 19%.
- *Utilising digital communication tools* for training, projects, knowledge and document sharing has enabled a 50% reduction in IT travel spend.

FUTURE PERSPECTIVES IN LOW CARBON AND GREEN ECONOMY

The Sappi group is exploring dissolving pulp as the basis for viscose (rayon) fibre, and for many other materials for which there are alternate choices, for example, acetate. The Wall Street Journal reported in January 2011 that dramatic increases in cotton prices (91 per cent in 2010) have caused many designers to turn to rayon as a cheaper alternative. In addition, climate change is causing concern about the water footprint of cotton. It is estimated, for example, that the Aral Sea has lost 80 per cent of its volume due to water being diverted for cotton upstream, and that while cotton is planted on 2,4 per cent of the planet's arable land, it accounts for 24 per cent of all insecticides and 11 per cent of global pesticides.⁴³ Against this backdrop, it is likely that consumers will turn increasingly to viscose material in the medium to long term.

Sappi was also expanding the Ngodwana mill operations in Mpumalanga province, South Africa, to produce chemical cellulose by 2013.⁴⁴ The expanded mill would produce Kraft linerboard, newsprint, as well as 210 000 tpa of chemical cellulose. In 2011, the group produced about 800 000 tpa of chemical cellulose from its sole producing Saiccor plant in KwaZulu-Natal, and supplies about 15 per cent of market demand, making it the largest supplier of the product in the world.⁴⁵ Driven by the Asian market, demand

for chemical cellulose is currently growing at about 6 per cent a year. There is consideration for further expansion of the chemical cellulose capacity in other parts of the world to maintain Sappi's market position.⁴⁶ With the expansion of Ngodwana Mill to supply chemical cellulose, it is anticipated that there will be a generation of excess power and steam, thus offering an opportunity to maximise the energy self-generation export of electrical power.

SOME CHALLENGES AND LEARNING POINTS

One of the challenges cited by Sappi, like any other player in the paper industry worldwide is facing, include the migration from paper to electronic as medium of communication. This decline is slow and inevitable and has resulted in a number of paper companies worldwide converting from primarily paper product producers with energy as a by-product to the other way round. More paper companies are closing, starting up capacity is in decline.

Globalisation has also resulted in the offloading of cheaper paper product imports, not only in South Africa but into Europe and North America from government-aided paper companies in the East, and this is an issue not only confined to paper. Paper companies see themselves as commodity producers, just like power and water supply; and paper as a resource that can not be differentiated in terms of value. On the other hand, almost anything on the market these days has the name of the manufacturer somehow made visible and marketers have long seen value in attaching their logo to their products. Paper companies do not do this as yet. When one buys a book or magazine, there is no idea which company has produced the paper.

Paper companies do not generally add product value. The challenge facing the industry is to start paper product manufacture according to customer's requirements, not just supplying the paper. There is also a need to dispel the myths associated with the fact that paper making cuts down trees. While this is true, Sappi does not cut down indigenous trees as some less than ethical companies still do in denuding tropical and boreal forests in an unsustainable way (i.e. without replanting). The raw material for paper needs to be seen as one that is planted and harvested just like any other agricultural crop.

The entire cradle-to-grave process for paper is one that in many cases absorbs more carbon than it emits as is the case with the South African pulp and paper industry. Another challenge is the view that the industry uses too much water in its plantations. Sappi indicates that their plantations do not use more water than the original vegetation (grassland), because their plantations require no irrigation. Furthermore, in viewing water use in terms of carbon capture, the plantation species are more than 20 times more efficient at this than any other agricultural crop in South Africa, including the grasses that they replaced.

Addressing the above-mentioned challenges is a significant educational challenge needed by Sappi and the industry. The industry has to re-align itself to changing circumstances. These include retaining paper as a preferred and more environmentally friendly packing medium.

CONCLUSION

Sappi has embraced leadership in energy self-sufficiency in South Africa. This position has also been realised by the company's repeated recognition on the CDP South Africa leadership and performance indices. Sappi also continues identifying and evaluating renewable energy, co-generation and bio-refining opportunities related to current and/or anticipated regulatory requirements. This is also being done in line with the group's vision and mission statements. Opportunities are being reviewed for achieving the required payback hurdles as the electricity supply industry, electricity price, and regulatory environment change in each region of operation. Although the main breakthrough for Sappi is to become fully energy self-sufficient, reduce purchased energy, as well as the potential for generating additional revenue through energy export, the company is pursuing any opportunity that will help ensure a reduction in its carbon footprint and mitigate climate change. To this end, Sappi is pushing forward with other initiatives including the development of a credible carbon footprint calculator and responding to the challenge of responsible water utilisation.⁴⁷

NOTES AND REFERENCES

- 1 SAPPI., 2009. Sappi Joins the Copenhagen Communiqué on climate change. Available at <http://www.risi-info.com/pulp-paper/news/Sappi-joins-the-Copenhagen-Communique-on-Climate-Change.html> [Accessed 23 June 2011].
- 2 Carbon Disclosure Project South Africa Report., 2007. JSE Top 40. Available at https://www.cdproject.net/CDPResults/CDP5_South_Africa_Report.pdf [Accessed 24 January 2012].
- 3 Ibid.
- 4 Xin, X. Yuding, W. and Jianzhong, W., 2011. The Problems and Strategies of the Low Carbon Economy Development. *Energy Procedia*, 5(0), pp. 1831–1836.
- 5 Szabó, L. Soria, A. Forsström, J. Keränen, J. T. and Hytönen, E., 2009. A world model of the pulp and paper industry: Demand, energy consumption and emission scenarios to 2030. *Environmental Science & Policy*, 12(3), pp. 257–269.
- 6 SAPPI., 2011. Group profile. Available at <http://www.sappi.com/regions/sa/group/GroupProfile/Pages/Divisional-overview.aspx> [Accessed 22 October 2012].
- 7 SAPPI sustainability report., 2010. Available at http://sappi.investoreports.com/sappi_sdr_2010/downloads/sappi_sdr_2010.pdf [Accessed 04 May 2011].
- 8 Ibid.
- 9 Carbon Disclosure Project 2009 South Africa JSE 100. Available at <https://www.cdproject.net/CDPResults/CDP%202009%20South%20Africa%20JSE%20100%20Report.pdf> [Accessed 24 January 2012].

- 10 Sappi Fine Paper North America sustainability report., 2011. Available at <http://www.sappi.com/regions/sa/Sustainability/Pages/Group-sustainability.aspx> [Accessed 20 February 2012].
- 11 Yuan, H. Zhou, P. and Zhou, D., 2011. What is Low-Carbon Development? A Conceptual Analysis. *Energy Procedia*, 5, pp. 1706–1712.
- 12 Brown, M. A. and Baek, Y., 2010. The forest products industry at an energy/climate crossroads. *Energy Policy*, 38(12), pp. 7665–7675.
- 13 Szabó, L. et al., 2009. Op Cit.
- 14 SAPPI sustainability report. 2010. Op Cit.
- 15 Ibid.
- 16 Karen Sherlock, Henry Coppens., 2011. Sappi response to questionnaire.
- 17 SAPPI., 2009. Sappi investor reports. Available at http://sappi.investoreports.com/sappi_sdr_2009/planet/reduce-greenhouse-gas-emissions-and-increase-our-use-of-renewable-energy/ [Accessed 20 October, 2011].
- 18 SAPPI sustainability report., 2010. Op Cit.
- 19 Ibid.
- 20 Ibid.
- 21 Brown, M. A. and Baek, Y., 2010. The forest products industry at an energy/climate crossroads. *Energy Policy*, 38(12), pp. 7665–7675.
- 22 Karen Sherlock, Henry Coppens., 2011. Op Cit.
- 23 South African Budget 2012: Budget Speech Facts & Figures Available at <http://www.moneyweb.co.za/mw/view/mw/en/page295023?oid=564377&sn=2009+Detail> [Accessed 23 March, 2012].
- 24 South Africa National Business Initiative., 2011. Emitting but also reducing. Available at <http://www.nbi.org.za/Pages/Publication-Details.aspx?NBIweb=e586ac5b-bcad-49be-ba41-81b0f1fa2ba3&NBlist=64654bc6-d34d-4582-999b-0778898cb878&NBIitem=81> [Accessed 6 December 2011].
- 25 South African Budget 2012: Budget Speech Facts & Figures. Available at <http://www.moneyweb.co.za/mw/view/mw/en/page295023?oid=564377&sn=2009+Detail> [Accessed 23 March 2012].
- 26 Karen Sherlock and Henry Coppens., 2011. Op Cit.
- 27 Patrick, K. Pulp and Paper Industry Poised to Take Center Stage in Global Bioenergy Arena. Available at <http://www.renewableenergyworld.com/rea/news/article/2008/08/pulp-and-paper-industry-poised-to-take-center-stage-in-global-bioenergy-arena-53239> [Accessed 01 February 2012].
- 28 Karen Sherlock and Henry Coppens., 2011. Op Cit.
- 29 FCC Initiative Statement October., 2008. A TFD Publication Beyond REDD The Role of Forests in Climate Change. www.theforestsdialogue.org. Available at <http://www.wbcsd.org/web/projects/forestry/TFDForestsandClimate%20StatementwBriefingNotes.pdf> [Accessed 01 February 2012].
- 30 SAPPI sustainability report. 2010. Op Cit.
- 31 SAPPI sustainability report., 2008. Available at http://sappi.investoreports.com/sappi_sdr_2009/downloads/sappi_sdr_2008.pdf Accessed 01 February 2012].
- 32 SAPPI., 2011. Available at <http://www.sappi.com/regions/sa/Sustainability/Documents/Sappi%20Group%20Sustainability%20Report%202011%20Smallest.pdf> [Accessed 01 February 2012].
- 33 SAPPI., 2009. Investor reports. Available at http://sappi.investoreports.com/sappi_sdr_2009/downloads/Sappi_Sustainability_Charter.pdf [Accessed 01 February 2012].
- 34 Ibid.
- 35 SAPPI sustainability report., 2010. Op Cit.
- 36 Ibid.
- 37 Ibid.

- 38 Ibid.
- 39 Ibid.
- 40 Ibid.
- 41 SAPPI sustainability report., 2009. Available at http://sappi.investoreports.com/sappi_sdr_2009/people/providing-training-and-development-opportunities/ [Accessed 22 October 2012].
- 42 SAPPI., 2011. Corporate social responsibility. Available at <http://www.sappi.com/regions/sa/SupportAndSponsorships/CSR/Pages/default.aspx> [Accessed on 10 February 2012].
- 43 Ibid.
- 44 Patrick K., 2008. Pulp and Paper Industry Poised to Take Center Stage in Global Bioenergy Arena. Available at <http://www.renewableenergyworld.com/rea/news/article/2008/08/pulp-and-paper-industry-poised-to-take-center-stage-in-global-bioenergy-arena-53239> 24/01/2012.
- 45 Karen Sherlock and Henry Coppens., 2011. Op Cit.
- 46 SAPPI sustainability report., 2009.
- 47 Ibid.
- 48 Pulp and paper news., 2009. Sappi achieves high ranking in Carbon Disclosure Project. Available at <http://www.pulppapernews.com/2009/10/sappi-achieves-high-ranking-in-carbon-disclosure-project> [Accessed 22 October, 2012].
- 49 SAPPI sustainability report., 2009.
- 50 Ibid.
- 51 Ibid.
- 52 Ibid.
- 53 SAPPI sustainability report., 2010.
- 54 Forest Industry Carbon Assessment Tool. Available at <http://www.ficatmodel.org/landing/index.html> [Accessed 10 February 2012].
- 55 CEPI Framework for the Development of Carbon Footprints for Paper and Board Products., 2007. Available at http://www.ncasi.org/support/downloads/documents/CEPI_Carbon_Footprint_report_2007.pdf [Accessed 01 February 2012].
- 56 Ibid.
- 57 SAPPI sustainability report., 2010.
- 58 Ibid.
- 59 Ibid.
- 60 American Forest and Paper Association Sustainability Report., 2010. Available at www.afandpa.org/WorkArea/linkit.aspx?LinkIdIdentifier=id...1402 [Accessed 22 October 2012].
- 61 SAPPI sustainability report., 2009.
- 62 UNESCO., 2005. The Water Footprint of Cotton Consumption. Available at <http://doc.utwente.nl/58372/1/Report18.pdf> [Accessed 24 January 2012].
- 63 SAPPI sustainability report., 2011. Available at <http://www.sappi.com/regions/sa/Sustainability/Documents/Sappi%20Group%20Sustainability%20Report%202011%20Smallest.pdf> [Accessed 22 October 2012].
- 64 SAPPI sustainability report., 2011.
- 65 SAPPI sustainability report., 2010.
- 66 Karen Sherlock and Henry Coppens., Op Cit.

Linking carbon to culture at Altron

*Grant R. Howard, Andrew Johnston
and Jannette Horn*

ABSTRACT

Climate change threatens human life and human well-being, and it is business organisations that have contributed largely to this problem in the quest for economic wealth. However, business organisations have the capacity and resources to mitigate climate change. Essentially it is people, driven by their organisational cultures, who control the interaction between organisations and the environment. This makes organisational culture critical for combating climate change. This chapter profiles a business organisation that has made a low carbon breakthrough affecting its organisational culture.

Allied Electronics Corporation Limited (Altron) is a multi-billion rand company listed on the Johannesburg Stock Exchange (JSE) in South Africa. Its businesses include telecommunications, multimedia, information technology, and power electronics. Altron's top management drives its organisational culture with a breakthrough in the form of linking senior executives' key performance indicators and performance bonuses to measurable carbon reduction targets. Remuneration linking clearly indicates that Altron is serious about its carbon reduction targets, and facilitates the necessary cultural changes for the transition to a low carbon and green economy. A low carbon organisational culture is the progressive weapon against climate change.

INTRODUCTION

This chapter profiles a business organisation that has made a low carbon breakthrough in its organisational culture. Altron's philosophy is applied in the form of measurable carbon reduction targets linked to the senior executives' key performance indicators (KPIs) and performance bonuses. Altron is one of the first companies in its domestic sector to

link carbon reduction targets to its senior executives' remuneration packages, beginning in the 2011/2012 financial year.

The South African government realises that considerable investment is required for addressing climate change and that economic, environmental, and social objectives must be carefully balanced.¹ Addressing climate change is, therefore, a South African urgency and an essential strategy for all businesses.² While there may be those who still doubt the science behind climate change, including global warming, the indisputable fact remains that climate change is a permanent business reality; indeed it is both a challenge and an opportunity.³ The resultant drive toward a low-carbon economy urges companies to add proactive carbon reduction policies or carbon dioxide (CO₂) emission reduction policies to their main strategic targets.⁴

Globally, it is business organisations and their operations that are directly responsible for much of the greenhouse gas (GHG) emissions; however it is people, in line with their individual beliefs and cultural norms, that steer these organisations. Therefore, organisational culture has to be a core and substantial part of all environmental solutions. Changing organisational culture is critical for the transition to a low carbon and green economy.⁵ Nevertheless, it is organisational culture that is often ignored by top management when environmental solutions are considered. This chapter focuses on Altron, a company that has made defining progress in creating a low carbon organisational culture through an industry breakthrough in the form of linking senior executives' key performance indicators and performance bonuses to measurable carbon reduction targets.

Allied Electronics Corporation Limited (Altron) is an investment holding company listed on the JSE in South Africa.⁶ Altron's principal subsidiaries are Allied Technologies Limited (Altech), Bytes Technology Group (Proprietary) Limited (Bytes), and Power Technologies (Proprietary) Limited (Powertech). The business of these principal subsidiaries includes telecommunications, multimedia, information technology, and power electronics.⁷

The Altech subsidiary is a leading South African multi-billion rand, high technology group.⁸ Altech is involved in the design, development, and convergence of telecommunications equipment, multimedia systems, and information technology (IT) solutions. Altech is also entrenched in the arena of secure technology solutions.⁹

The Bytes subsidiary is a leading group of information and communications technology (ICT) companies. Bytes strive for its clients to experience excellent performance through its solutions. Bytes operates predominantly in South Africa, although it has operations in several African countries and in the United Kingdom (UK). The companies within Bytes are leaders in their field and they offer a broad range of products, technical skills, specialised services, support, and ultimately, solutions to a wide spectrum of clients across a multitude of business sectors.¹⁰

The Powertech subsidiary is one of the leading suppliers of electrical and electronic equipment in southern Africa. Powertech also has a presence in the UK and Iberian Peninsula. Powertech has achieved this through organic growth, exports, and

acquisitions. Powertech consists of a large number of individual operations organised into five operating divisions, namely cables, transformers, batteries, and industrial and system integrators. Powertech specialises in the manufacturing and delivery of world class products, services, expertise, and solutions to address the diverse electrical and power equipment requirements locally and internationally. Powertech's markets include power infrastructure, large power users, mining, telecommunications, transport, and building and construction.¹¹

LITERATURE REVIEW

Environmental scientists confirm the vulnerability of the South African region to climate change, and the associated, severe risks to economic development in the region.¹² Part of the vulnerability of developing countries like South Africa is the limited resources that are available for climate change adaptation. With this in mind, the South African government released the National Climate Change Response White Paper in October 2011 ahead of the Seventeenth Conference of the Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC) and the 7th Session of the Conference of the Parties serving as the Meeting of the Parties (CMP7) to the Kyoto Protocol, hosted in Durban, South Africa.¹³

The White Paper indicates that the government is in the process of reviewing all legislation, policies, strategies, plans and regulatory frameworks to effectively combat climate change. Furthermore, the South African government recognises that business and industry play a fundamental role in the country's climate change response, and the government promotes partnerships with business and industry for transitioning to a low carbon and green economy. In addition, the South African government has begun to mandate that industry develops mitigation and lower carbon strategies, and that these developments include measurable and verifiable indicators to monitor the implementations and outcomes.¹⁴ Such policies, as highlighted in chapter 2, include the National Climate Change Response White Paper.

This forms Altron's environment, and the group is in the process of changing its entire culture to transition to a low carbon and green economy. The focus on changing culture is significant. For clarity, an organisation's culture can be described as an organisation's customary ways of doing things, including the underlying and integral philosophies and assumptions.¹⁵ Another useful description of organisational culture explains that organisational culture relates to the embedded beliefs and values of the organisational members; organisational culture portrays the less conscious, subtle psychology of the workplace.¹⁶ Changing organisational culture is paramount for a successful transition to a low carbon and green economy. The key point is that organisations are the people in them and if those people do not change then there is no change.¹⁷ Changes in aspects like structure and technology are only effective if those changes are accompanied by changes

in the psychology and the culture of the people in the organisation.¹⁸ Organisational culture begins with and is the responsibility of top management. The practices that top management implements, the values that top management communicates, and the actions that top management performs establish the organisational culture.¹⁹

THE CASE FOR ADDRESSING CLIMATE CHANGE

Altron's transition to a low carbon and green economy is driven from a business perspective with a focus on return on investment (ROI), closely followed by environmental opportunities and reputational risks.²⁰ This perspective and focus was maintained by the group's local and international climate change risk management group, but since 2011 it has been managed and driven by the group's newly established sustainability department. Risk management is an effective and well recognised approach to climate change, involving risk assessment, risk options appraisal, bearing risks, and managing risks.²¹ Specifically, Altron performs comprehensive risk analyses involving risk identification, risk evaluation in financial terms, and the development of mitigation strategies.

Significant reputational risk is associated with not responding to climate change, and Altron mitigates this risk through seeking admission to the JSE's Socially Responsible Investment (SRI) index; extensive GHG emissions reporting; fulfilment of the Global Reporting Initiative (GRI) requirements; compliance with the United Nations Global Compact (UNGC) principals; and participation in the annual Carbon Disclosure Project (CDP) survey. Apart from the reputational risks, there are material financial risks associated with not responding to climate change. These financial risks stem from the proposed carbon taxation and the forecasted physical environment changes, which include coastal flooding and sea level rise, severe weather conditions, natural disasters, increases in mean surface temperatures, and water shortages. These physical environmental changes are expected to result in damage and disruption to operations, interrupted services, increased demand for energy especially for cooling, and limited access to supplies and exports via ports. Financial losses are expected in the form of soaring repair costs, high energy costs, additional taxes, and lost income.

There is also the risk of losing customers and industry partners, especially in the international market place. Most of the group's large international customers and industry partners require carbon monitoring and carbon data. In particular, international customers that receive exports are demanding environmental management systems (EMSs) in accordance with ISO14001. ISO14001 is developed by the International Organisation for Standardisation (ISO) and provides standardised requirements for an EMS.²² Altron has implemented ISO14001 EMSs in its manufacturing plants and uses an electronic dashboard for monitoring environmental data, including carbon emissions.

Another important risk is that emerging from domestic legislation. Altron expects that in the future there will be legislated compulsory GHG emissions reporting. Nonetheless,

since 2008 Altron has been measuring and reporting its carbon footprint and emissions based on international standards. Carbon foot printing is a widely used measure for analysing GHG emissions related to human activities. A carbon footprint is also a useful tool for assisting customers to shop for products with the lowest carbon.²³

Besides risk management, Altron's transition to a low carbon and green economy is driven by business opportunities. Climate change increases the demand for low carbon services and products. Products and services such as the hybrid power schemes and photovoltaic are provided by both the group's renewable energy business, Rentech, and their battery business, the Powertech Battery group, with local brands including Willard Batteries and SABAT Batteries. The Kyoto Protocol, a protocol of the UNFCCC that addresses global warming, presents further business opportunities. The Kyoto Protocol regards South Africa as among the non-annex 1 countries, and these countries are encouraged to develop voluntary emission reduction projects based on the subsumed Clean Development Mechanism (CDM) framework.²⁴ Specifically, the CDM framework presents market-based financial motivation for such voluntary emission reduction projects.

Altron will be exploring the opportunities provided under the CDM programme, especially activities within its manufacturing operations. These opportunities require the quantification of the group's carbon footprint, which is complete, and the CDM framework business opportunities are currently available to Altron. Other business opportunities may emerge from the imposition of GHG emissions regulations, as well as regulatory requirements for energy efficiency in South Africa. In particular these opportunities exist for the Altron Company, Powertech IST Otokon, which supplies energy and power quality management support solutions for electrical, mechanical, and chemical systems. Competitive advantage is a vital driver for any business.²⁵ Altron's commitment to work towards a low carbon and green economy presents competitive advantage opportunities for the group. Specifically, the companies within the Powertech group are appropriately positioned to seize these opportunities.²⁶

ENABLERS FOR LOW CARBON TRANSITION

Altron's risk management approach is a key enabler in the transition to a low carbon and green economy. The risk management committee, together with its dedicated sustainability department and carbon champions are responsible for climate change risk management. These groups provide the link between operational management and the executive board. The risk management committee is made up of chief executive officers (CEOs) from Altron's operating companies, along with the group chief executive and other senior non-executive directors and executive directors. Sustainability is kept as a standing agenda item at the risk management committee meetings. In addition, the chairman of the risk management committee highlights all material sustainability risks

and mitigation strategies at the Altron board meetings. The group has also appointed key individuals at board level to represent the sustainability agenda.

Another key enabler is Altron's philosophy, which stipulates that managing is dependent on measuring. Altron applies this philosophy to every aspect of its climate change response, and importantly, to its climate change strategy. The group's climate change strategy is a critical enabler for changing its organisational culture into a culture that is dedicated to a low carbon and green economy. However, developing an effective climate change strategy, and one that can have the desired effect on the organisational culture, is a substantial exercise.

A number of general strategy development steps are prescribed for an effective climate change strategy. The exact sequence of the steps is suited to the unique characteristics of each organisation. The first steps entail assembling climate change information for integrating the business strategy with GHG reductions.²⁷ These steps require assessments of an organisation's emissions profile, gauging of the risks and opportunities, evaluating action options, and setting GHG reduction goals and targets.²⁸ The subsequent step entails integration of the GHG reduction goals and targets within the organisation through supportive, financial and structural mechanisms, and engagement with employees.²⁹ It is at this level where organisational leadership is crucial for changing the organisational culture, and Altron's leadership has excelled in this regard by linking carbon reduction targets to executive remuneration. The final general strategy development steps require an organisation to understand and be involved in the external regulatory processes; and to manage all external relations that are vital to the success of the organisation's initiatives.³⁰

Altron's strategy development steps began in 2007, when the group embarked on its journey to understand, measure, and reduce its carbon footprint. Although a challenging exercise, the strategy has positively affected its organisational culture and enabled its transition to a low carbon and green economy. Originally, the carbon committee conceived and developed the strategy, presented it to the Altron executive committee, gained the necessary Altron Board approval, and subsequently the strategy was implemented across the group.

The strategy was implemented in four phases.³¹ The first phase focussed on awareness and communication, seeking group-wide buy-in through shared understanding of climate change and its ramifications. This group-wide initiative resulted in a position paper on climate change that is endorsed by the chief executive. The position paper acknowledges the group's environmental risk areas; commits to transparent reporting; commits to responsible management and progress against goals; and charts the way forward for strategically addressing climate change throughout the group. Phase one was particularly challenging because it presented new concepts which many people did not understand well. This resulted in extensive communication and awareness campaigns to gain the required commitment and unified awareness from management and employees.

The second phase involved calculating the group's carbon footprint.³² During this phase, over the 2008/2009 financial year, Altron determined its carbon footprint baseline. The carbon footprint baseline allows the group to investigate emission sources and specify emission reduction targets. This exercise quantified the group's initial carbon footprint and revealed the implementation strengths and challenges of the quantification methodology. Some of the challenges encountered were defining the diverse operational and organisational boundaries, carbon data management, conversion factors, and carbon reporting. Despite these challenges, Altron managed to report their carbon footprint for the first time in their sustainability report in 2008.

The third phase of the strategy concentrated on refinement of scope and development of the carbon footprint methodology manual.³³ The methodology manual included the group's carbon footprint data collection and measurement methodology, and captured the progress towards adopting standard and agreed measurements across all the operations in the group. Later, in 2010, Altron incorporated the carbon footprint methodology manual into its newly developed sustainability manual that is reviewed and updated on an annual basis.

The third phase's refinement of scope is evident in the 2009 annual report's carbon footprint disclosure. The annual report includes scope 1, scope 2 and limited scope 3 emissions under the Greenhouse Gas Protocol. The Greenhouse Gas Protocol is an international accounting tool for business and government to understand, quantify, and manage GHG emissions.³³ By definition, scope 1 emissions are direct emissions from the combustion of fuel in furnaces, boilers, and generators owned by the group; and business travel emissions from vehicles owned by Altron. Scope 2 emissions result from electricity consumption in buildings owned by the group.³⁴ Scope 3 emissions are other indirect emissions including emissions from electricity consumption in buildings leased by the group; the emissions from transport allowances provided to staff; the emissions from business travel in private vehicles; the emissions from air travel; the emissions from the consumption of paper products; and the emissions from business travel in rental vehicles.

Carbon foot-printing is expressed in metric tonnes of equivalent carbon dioxide (tCO₂e), which is a global standard unit of measurement that enables the global warming potential (GWP) of different GHGs to be compared. Conversion factors enable operational data to be converted into tCO₂e, for example, operational data can be the number of litres of fuel used or the number of kilowatt-hours of electricity used.³⁵

Further refinement of scope occurred in 2010, when Altron's carbon footprint reporting increased substantially, including more foreign operations, joint ventures, and business units. Then, in 2011 during two key workshops, the operational and organisational boundaries were further defined; and the base year of the GHG inventory was confirmed. In addition, both the requirements of ISO14064-1 and the Greenhouse Gas Protocol were incorporated into the base year GHG inventory assessment. ISO14064-1 is developed by the ISO and specifies the organisation level requirements and principles for GHG emissions and removals quantification and reporting.³⁶ ISO14064-1 also specifies development,

design, reporting, management, and verification requirements for organisational GHG inventories.³⁷

Subsequently, the fourth phase of the strategy began, focusing on setting reduction targets and realising commercial opportunities through the CDM framework.³⁸ At a pivotal workshop in 2011, Altron furthered the process of establishing emission reduction targets based on the 2009/2010 financial year's carbon footprint results; and set future three-year CO₂ emission reduction targets. Importantly, detailed analyses of each business unit's energy reduction initiatives were carried out; and a separate benchmarking assessment was conducted on comparable diversified, global organisations. The detailed analyses and benchmarking assessment were done in order to set effective emission reduction targets. The benchmarking assessment provides valuable external information to assess the current targets and the initiatives for achieving these targets. Interestingly, most of the emission reduction initiatives implemented by the benchmarked companies are energy efficiencies through process and infrastructure improvements; renewable energy technologies; and employee behaviour changes.

Emission reduction initiatives, like energy efficiency technologies, are a central focus for Altron and enable the transition to a low carbon and green economy. These initiatives have the added benefit of addressing the high and increasing electricity tariffs from the South African public utility electricity supply commission (Eskom).³⁹ These tariffs are materially impacting the entire South African manufacturing sector by elevating operating costs. For this sector, it appears that the most viable energy cost reduction opportunities involve developing energy efficiency measures and alternate energy sources. In the short to medium term, the majority of Altron's energy will be derived from fossil fuel generated electricity, mostly coal, and coal generated electricity is the biggest source of GHG emissions in southern Africa. The group seeks to reduce its reliance on fossil fuels by integrating energy efficiencies across its businesses, instead of focusing on alternate sources of energy.⁴⁰

To date, Altron has continued in its firm commitment to setting emission reduction targets and quantitatively evaluating its emission reduction initiatives against these emission reduction targets. The benchmarking assessment and quantitative evaluation feedback enables the setting of realistic and meaningful reduction targets and relevant performance and remuneration targets for the group's senior management. Further, Altron has integrated sustainability into all elements of its businesses, and encourages its customers and suppliers to do the same. The group has developed an effective climate change strategy, and one which is congruent with the general climate change strategy development steps. Crucially, Altron's climate change strategy is an integral part of its business strategy; creating a culture that is dedicated to a low carbon and green economy.⁴¹

LINKING CARBON TO CULTURE

Linking carbon to culture stands out as a major breakthrough in terms of moving the company towards a low carbon and green economy. Altron's philosophy is applied in the form of measurable carbon reduction targets linked to the senior executives' KPIs and performance bonuses. Altron is one of the first companies in its domestic sector to link carbon reduction targets to its senior executives' remuneration packages, beginning in the 2011/2012 financial year. The implementation applies to all executive members represented at the group's executive committee. Effectively, a certain percentage of each executive's remuneration pertaining to predetermined key performance indicators is linked to operational carbon targets, and each financial year the percentages will be reviewed and updated.

In the global business arena, linking carbon reduction targets to remuneration is not a new concept, although its implementation is not widespread. Remuneration linking is an effective tool to drive carbon reduction performance. Setting and rewarding carbon reduction KPIs sends a strong message to everyone from investors, to senior executives, to shop-floor workers, that the organisation is serious about its carbon reduction targets.⁴² Remuneration linking compels an organisation to set clear and measurable goals, to obtain commitment from the top, and to communicate carbon reduction throughout the organisation. Remuneration linking takes carbon reduction beyond just the annual reports and into real time performance accountability.⁴³ Altron's remuneration linking is a breakthrough initiative because of its originality and effectiveness in the transition to a low carbon and green economy.

There are several advantages to remuneration linking; it demonstrates that carbon reduction is part of the business; it provides a shared understanding of carbon reduction throughout the organisation; it empowers executives to invest time and resources into carbon reduction; it ensures executive objectives are aligned to the organisation's carbon reduction strategies; and it encourages innovative solutions for carbon reduction.⁴⁴ The fact is that there is no meaningful carbon reduction history, or even abundant literature with proven, effective, long term strategies or business models for carbon reduction. Remuneration linking is creating history, it is a pioneering initiative, and organisations throughout the world are becoming more aware of its effectiveness.⁴⁵ Several international CEOs regard remuneration linking as one of the most effective ways to affect active carbon reduction monitoring and management. In essence, people tend to do what they get paid to do.⁴⁶

Remuneration linking indicates that an organisation has reached a level of maturity about carbon reduction, and most important, carbon reduction has become part of the organisation's culture.⁴⁷ Linking carbon reduction targets to top management's remuneration facilitates the necessary cultural changes for Altron's transition to a low carbon and green economy.⁴⁸

OTHER LOW CARBON INITIATIVES

Altron's low carbon and green economy culture is evident in its many low carbon initiatives. Altron's carbon and related reporting is a crucial low carbon initiative. The group has integrated its sustainability reporting throughout the organisation in accordance with the King III Report on Governance for South Africa, 2009.⁴⁹ These integrated reporting processes culminate in the integrated annual report each year. The integrated annual report includes the key aspects of the group's transition to a low carbon and green economy.

Further, in 2010, Altron received the Association of Chartered Certified Accountants South Africa (ACCA SA) Best Sustainability Report (Most Improved Report) award.⁵⁰ This award demonstrates annual improvements in sustainability. The award is prominent because the judging panel reviewed 51 sustainability reports, including most of the JSE Top 40 listed companies. Similarly, in 2010, the company received a gold certificate from the CDP for its high rating in the CDP Index.⁵¹ Altron's score of 81 per cent placed it in a joint 10th place among the JSE Top 100 companies; this is an increase of seven places from the previous year. This achievement was the result of the dedication of each and every one of its employees.

The group has achieved other key reporting milestones, namely the inclusion in the JSE's SRI Index since its inception in 2004; an achievement of 100 per cent score in the JSE SRI index Environment, Society and Governance (ESG) categories in 2011; and the receiving of an excellent rating at the annual Ernst and Young Best Sustainability Awards in 2011. Furthermore, in 2011, Altron volunteered to submit their first CDP water disclosure, and committed to set initial water and waste reduction targets for the group in 2012.

Altron's Envirowatch campaign cannot go unnoticed, as this plays a major role in fostering employee commitment to a low carbon and green economy culture.⁵² The scope of the group's Envirowatch campaign now includes all environmentally related issues, even though the Envirowatch campaign was initially established for promoting energy efficiencies. In November 2010, approximately 12 000 employees (about 94 per cent of all employees throughout the group) signed a pledge to be greener, reduce carbon emissions, reduce waste, and save water. Altron's aim is to decrease its carbon footprint by an average of 3 per cent by the end of the 2014 reporting period. To this end, each business unit has specified their particular reduction targets. Further, Altron's intranet provides access to the new Envirowatch website, which provides employees with information on how to practically reduce their carbon footprint, as well as important green and sustainability issues.

Of special cultural relevance was Altron's signing of the Copenhagen communiqué on climate change, illustrating that Altron is committed to reducing its carbon footprint.⁵³ The Copenhagen communiqué on climate change is the definitive, progressive statement from the international business community that was published ahead of the United Nations (UN) climate change conference in Copenhagen in December 2009.

Other key cultural changes are demonstrated through the establishment of the new sustainability department; the identification of over 60 environmental champions across the group; the conducting of carbon reduction, and water and waste reduction workshops; the training of employees from facility staff to CEO level; the carbon management guidance from the group's company secretary; and the implementation of an active safety, health and environmental (SHE) policy.

From a subsidiary company perspective there are several important energy saving initiatives. Altech Isis converted approximately 35 per cent of its servers to virtual platforms and saved almost 20 000 kilowatt-hours (kWh) of electricity per annum. The company has also drafted a plan to replace older cathode ray tube (CRT) monitors and inefficient desktops with more energy-efficient liquid crystal display (LCD) monitors, for an expected power saving of 17 600 kWh per annum. Altech Isis, together with Altech UEC, installed power factor correction equipment with automatic switch-off functionality for those power-consuming systems that are not in use. In addition, Altech commissioned Arrow Altech Distribution to conduct an energy-efficiency study, the results of which inform further energy-saving initiatives. Furthermore, Powertech IST Otokon developed several energy-saving products for energy monitoring, energy prediction, and energy control.⁵⁴

In 2006 Bytes Managed Solutions conducted a full energy audit and decided to install electro-sense lights in its building. The system works with a motion sensor that controls lights within a specific office or work area, ensuring that lights are off when people do not need them. The system gives Bytes a 65 per cent saving on electricity, and based on the size of the building of 14 000 square meters (m²) this equates to a saving of approximately R35 000 per month. Powertech head office has also implemented similar elements into their building and used one of their own companies to do it.

During 2008, Willard Batteries took the initiative to address its reliance on natural resources by introducing plastic pallets for the transport of lead-acid batteries to distribution centres from its Port Elizabeth, South Africa, production site. Traditionally, wooden pallets were used although these often became contaminated through leakage and had to be discarded. June 2008 marked the roll out of 6 385 of these new-look pallets created with 255 tons of waste plastics. The company plans to eventually replace all wooden pallets with plastic ones. The plastic pallets have an estimated lifespan of between nine and 10 years after which they can be converted back into plastic pellets. Through this initiative the company is ensuring that it reduces reliance on natural resources like trees, while setting the bar high for recycling as an integral and sustainable business practice.

Willard Batteries also makes it a key responsibility to ensure that automotive batteries and industrial cells are not disposed of in landfills. There are over two and a half million automotive batteries sold into the replacement market annually, and thousands of industrial cells are sold annually. These products are highly toxic and environmentally hazardous if disposed of in landfills. The company encourages the collection and recycling of these batteries after their useful life. The lead-acid batteries are recycled through a multi-phase process, which results in lead ingots from the lead grids, and oxide and

plastic pellets from the plastic parts. In addition, the battery acid is processing into either water for release into the sewerage system; or into an odourless white powder called sodium sulphate, which is used in glass, laundry detergent, and textile manufacturing.

In addition, Willard Batteries has partnered with FTFA to raise awareness around the importance of recycling and product stewardship. The company donates a portion of the recycling proceeds to FTFA to facilitate the purchase of indigenous trees for communities in need. Now in its fifth year, the programme has seen more than 4 500 indigenous trees planted around South Africa. The company also participates in National Arbour Week to promote and create awareness for planting and maintaining indigenous trees in southern Africa. In September 2010, as part of Arbour Month, the Altron group again partnered with FTFA to plant 150 indigenous trees at three different South African primary schools based in Tembisa, Dobsonville, and Alexandra.

In 2011, two of the group's larger manufacturing operations, namely Altech UEC and Aberdare Cables, moved into new facilities that included improved energy saving initiatives. Altech UEC's energy savings include a 10 per cent reduction in compressor power, a 350 000 British thermal units (BTU) reduction in air conditioner requirements, and a 30 per cent reduction in office lighting requirements achieved through re-designed office space. Future plans include daytime lighting management by installed skylights providing natural lighting where possible,⁵⁵ and electricity metering in various areas to enable better electricity management. Aberdare's energy savings are obtained from low energy lighting, timers on lighting, automatic light sensors, timers on air-conditioning, closed loop systems for water cooling, monitoring of electricity, and establishing peak operating times for machines and manufacturing equipment. Future plans include an appointed consultant that will be looking at all possible energy and related saving initiatives within Aberdare, including the investigation of power factor meters.

In April 2010, Altron and Natural Balance joined forces to bring about sustainable social change while combating climate change. The project develops the heat retention cooker, called the Wonderbag, whose carbon reduction abilities are at least 500 kilograms (kg) per bag per year with regular use. This aligns perfectly with the group's drive to reduce its own carbon footprint.⁵⁶ Marketed and distributed by the social enterprise called Natural Balance SA, the bags are manufactured by a skills development and job creation non-governmental organisation (NGO). The NGO is called Youth for Survival (YFS) and it provides unemployed people with sewing skills. Along with demonstrations and profiling on the Altron intranet, Wonderbags are sold to staff at a reduced price. Altron also commissions YFS to make a special catering size bag, 142 of which are in the process of being donated to 71 feeding schemes to assist with meal preparation. The beneficiaries of the Wonderbags stand to reduce their energy-for-cooking costs by at least 50 per cent.⁵⁷

In 2008, Altron began supporting a project that addresses biodiversity and sustainable environmental conservation, human skills development and training, and job creation. The project is called the Riverine Rabbit Programme (RRP) and it is an initiative of the Endangered Wildlife Trust (EWT). The Riverine Rabbit (*Bunolagus monticularis*) is

one of the world's rarest terrestrial mammals and is endemic to the dense riverine scrub along the seasonal rivers of the central Karoo of South Africa. It is one of South Africa's most endangered species because more than 60 per cent⁵⁸ of its original habitat has been converted for agriculture on private farms. There are also threats resulting from dogs and traps; and it has an unusually low breeding rate.

The RRP focuses on rehabilitating degraded riparian zones in the Karoo, and thereby enabling the Riverine Rabbit to survive in its natural habitat. Altron's support for the programme is holistic in nature, involving the previously disadvantaged community of Loxton to help to save the species. The RRP includes establishing an indigenous plant nursery on municipal grounds, and employs local women to grow indigenous Karoo shrubs for the purpose of rehabilitating the degraded habitats of the Riverine Rabbit. Altron, Altech, AltechNetstar, Bytes, and Powertech have all contributed to this project and continue to do so.⁵⁹

KEY CHALLENGES AND FUTURE PLANS

Altron's huge operational diversity presents a number of key challenges. These challenges include collecting accurate and compatible carbon data; developing a monitoring system to manage and control the carbon data; and finding globally accepted conversion factors for all the carbon data that is collected from the diverse global operations. There is no single conversion factor standard that meets all of Altron's diverse operational requirements, although much reliance is placed on the Intergovernmental Panel on Climate Change (IPCC) guidelines and Greenhouse Gas Protocol. The group's operational diversity also makes it difficult to obtain the necessary collective buy in, particularly from those companies that do not have a big carbon footprint or that do not operate in Africa. Other challenges include ensuring that all employees have the same knowledge about carbon footprinting; obtaining middle management buy-in; and establishing middle management accountability.

Looking ahead, Altron plans to finalise its sustainability reference manual, by completing a section on carbon indicators and initiatives. In September 2011, the group implemented an environmental data collection system to provide environmental data that is relevant, accurate, compatible, and collected timeously. In addition, Altron intends to participate in a new benchmarking exercise against similar international companies and industries. In the short to medium term, the group plans to obtain an independent assurance of its entire integrated annual report, including its sustainability and environmental data. Importantly, Altron aims to do a value chain survey with its top suppliers and clients. One of the objectives is to improve the upstream and downstream carbon footprint of its products and services.

CONCLUSION

Response to climate change is urgent, especially for a developing country like South Africa. While there may be those who still doubt the science behind climate change, including global warming, the indisputable fact remains that climate change is a permanent business reality; indeed, it is both a challenge and an opportunity. Business organisations have the power to exacerbate or mitigate climate change because of their prominence as social structures and the sizeable resources under their control. Nevertheless, it is people who ultimately control the interaction between organisations and the environment, and people themselves are guided by the norms and dictates of their organisational culture. Thus, organisational culture determines how organisations interact with the environment; and a low carbon organisational culture is fundamental for the transition to a low carbon and green economy.

Altron has made emphatic progress in creating a low carbon organisational culture. The group's success can be attributed largely to the unwavering commitment, buy-in, and support from top management and employees. However, it is top management that drive organisational culture, and the group's top management are driving Altron's low carbon organisational culture with a breakthrough, being the measurable carbon reduction targets that are linked to the senior executives' KPIs and performance bonuses. Remuneration linking clearly indicates that Altron is serious about its carbon reduction targets, and it facilitates the necessary cultural changes for the transition to a low carbon and green economy. A low carbon organisational culture is the progressive weapon against climate change.

NOTES AND REFERENCES

- 1 Is South Africa on track to a green economy?, 2010. *Management Today*, 28(6), pp. 42–43.
- 2 Climate change: Impacts, vulnerabilities and adaptation in developing countries., 2007. United Nations Framework Convention on Climate Change (UNFCCC). Available at <http://unfccc.int/resource/docs/publications/impacts.pdf> [Accessed 17 October 2011].
- 3 Hoffman, A. J. and Woody, J. G., 2008. Climate change: What's your business strategy? United States of America: Harvard Business Press.
- 4 Coto-Millán, P. Quesada, J. L. D. and Mantecón, I. M., 2008. Corporate ecological footprint: New conversion factors. *International Journal of Ecology*, pp. 1–4.
- 5 Hoffman, A. J., 2010. Climate change as a cultural and behavioural issue: Addressing barriers and implementing solutions. *Organisational Dynamics*, 39, pp. 295–305.
- 6 Altron., <http://www.altron.co.za> [Accessed 02 August 2011].
- 7 Ibid.
- 8 Ibid.
- 9 Ibid.

- 10 Ibid.
- 11 Ibid.
- 12 Richards, R., 2008. Assessing progress on climate change policy and practice: Observations from South Africa and SADC. Johannesburg, South Africa: Centre for Policy Studies. Available at http://www.cps.org.za/index.php?option=com_content&task=view&id=56&Itemid=82 [Accessed 14 March 2012].
- 13 DEA (Department of Environmental Affairs), 2011. National climate change response white paper 2011. Pretoria: DEA. Available at <http://www.pmg.org.za/node/28739> [Accessed 4 March 2012].
- 14 DEA (Department of Environmental Affairs), 2011. Op Cit.
- 15 Burack, E. H., 1991. Changing the company culture – The role of human resource development. *Long Range Planning*, 24(1), pp. 88–95.
- 16 Schneider, B. Brief, A. P. and Guzzo, R. A., 1996. Creating a climate and culture for sustainable organisational change. *Organisational Dynamics*, 24(4), pp. 7–19.
- 17 Berkhout, F., Hertin, J. and Gann, D. M., 2006. Learning to adapt: Organisational adaptation to climate change impacts. *Climatic Change*, 78(1), pp. 135–156.
- 18 Schneider, B. et al., 1996. Op Cit.
- 19 Bass, B. M. and Avolio, B. J., 1993. Transformational leadership and organisational culture. *Public Administration Quarterly*, 17(1), pp. 112–121.
- 20 Johnston, A., 2010. Carbon footprint – Lessons learned and strategies applied. *25 Degrees in Africa*, 5(6), pp. 8–10. Available at http://25degrees.net/index.php?option=com_zine&view=article&id=1111 [Accessed 31 January 2012].
- 21 Berkhout, F. et al., 2006. Op Cit.
- 22 ISO 14001:2004/Cor 1:2009. Available at <http://www.iso.org/iso/search.htm?qt=14001&searchSubmit=Search&sort=rel&type=simple&published=on> [Accessed 14 November 2011].
- 23 Wood, R. and Dey, C.J., 2009. Australia's carbon footprint. *Economic Systems Research*, 2009, 21(3), pp. 243–26.
- 24 Kyoto Protocol. Available at http://unfccc.int/kyoto_protocol/items/2830.php [Accessed 13 March 2012].
- 25 Carbon disclosure project., 2010. Available at <http://www.altron.co.za/pdf/sustainability/cdp.pdf> [Accessed 02 August 2011].
- 26 JSE SRI index review 2010., 2010. Available at <http://www.altron.co.za/pdf/sustainability/Allied%20Electronics%20Corporation%20Limited%20%28Altron%29%20profile.pdf> [Accessed 02 August 2011].
- 27 Hoffman, A. J., 2010. Op Cit.
- 28 Hoffman, A. J., 2006. Getting ahead of the curve: Corporate strategies that address climate change. Virginia, USA: Pew Center on Global Climate Change. Available at http://www.pewclimate.org/docUploads/PEW_CorpStrategies.pdf [Accessed 17 October 2011].
- 29 Hoffman, A. J., 2010. Op Cit.
- 30 Hoffman, A. J., 2006. Op Cit.
- 31 Johnston, A., 2010. Op Cit.
- 32 Ibid.
- 33 Greenhouse gas protocol. Available at <http://www.ghgprotocol.org/> [Accessed 04 November 2011].
- 34 Altron. Op Cit.
- 35 Ibid.
- 36 ISO14064-1:2006. Available at http://www.iso.org/iso/catalogue_detail?csnumber=38381 [Accessed 04 November 2011].
- 37 Ibid.

- 38 Johnston, A., 2010. Op Cit.
- 39 EnviroWatch., 2010. Available at http://www.altron.com/environment/Altron_EnviroWatch.pdf [Accessed 02 August 2011].
- 40 Altron integrated annual report 2011., 2011. Available at <http://www.altron.co.za/annual2011/pdf/altronAR2011.pdf> [Accessed 02 August 2011].
- 41 Chief executive's review 2011., 2011. Available at <http://www.altron.co.za/annual2011/pdf/chiefExecutivesReview.pdf> [Accessed 26 October 2011].
- 42 Linking pay to sustainability - The world business council for sustainable development (WBCSD)., 2011. Available at <http://www.wbcsd.org/plugins/DOCSEARCH/details.asp?DocTypeId=-1&ObjectId=MzkyNDA&URLBack=result.asp%3FDocTypeId%3D-1%26SortOrder%3D%26CurPage%3D1> [Accessed 27 October 2011].
- 43 Ibid.
- 44 People matter reward: Linking sustainability to pay., 2011. Geneva, Switzerland: World Business Council for Sustainable Development (WBCSD). Available at http://www.wbcsd.org/DocRoot/fXxvKXV3Cbp-pjvboQgG3/WBCSD_People%20Matter%20Reward.pdf [Accessed 27 October 2011].
- 45 Ibid.
- 46 Ibid.
- 47 Epstein, M. J. and Roy, M. J., 2001. Sustainability in action: Identifying and measuring the key performance drivers. *Long Range Planning*, 34(5), pp. 585-604.
- 48 Remuneration report 2011., 2011. Available at <http://www.altron.co.za/annual2011/pdf/remuneration.pdf> [Accessed 26 October 2011].
- 49 The King Report on Corporate Governance. Available at <https://www.saica.co.za/TechnicalInformation/LegalandGovernance/King/tabid/626/language/en-ZA/Default.aspx> [Accessed 13 March 2012].
- 50 Altron., 2011. Op Cit.
- 51 Ibid.
- 52 Ibid.
- 53 Ibid.
- 54 Ibid.
- 55 AltronEnviroWatch. 2010.
- 56 Altron integrated annual report 2011., 2011. Op Cit.
- 57 Ibid.
- 58 Ibid.
- 59 Carbon disclosure project., 2010. Op Cit.

Ensuring sustainability through strategy at Barloworld

Godwell Nhamo

ABSTRACT

The drivers for Barloworld to take the route of ensuring sustainability through strategy as a vehicle of transition to greener economy fall under three categories, namely: organisational reputation; internal cost savings; and the need to open up new business opportunities. Barloworld's defining characteristic in terms of enablers towards transition to a low carbon and green company is its integrated approach that addresses environmental (including climate change), social, and financial needs. To this end, the group has a longstanding Value Based Management (VBM) approach. The VBM approach addresses long term value creation for all the group's stakeholders, and the goal of being a responsible corporate citizen. Barloworld has entrenched a sustainable development culture into its strategy by identifying it as one of the six Strategic Focus Areas. The identification of sustainable development as a strategic issue, therefore, stands out as the major breakthrough. Linked to this breakthrough are divisional initiatives including: energy and resulting emission efficiency improvements; products including supply chain optimisation tools (Combined Inventory and Network Optimisation, CAST-CO₂); external and internal communication; rebuilding machines and components; green trailer; green buildings; The Carbon Offsetting Programme at Avis Rent a Car; water recycling and harvesting; and alternative fuel sponsorship. These are low carbon and green economy issues that this case study profiles. The conclusion is that Barloworld has operationalised its transition to low carbon and green economy and the results testify to this narrative.

INTRODUCTION

Barloworld has entrenched a sustainable development culture into its strategy by identifying it as one of the six Strategic Focus Areas. The identification of sustainable development

as a strategic issue, therefore, stands out as the major breakthrough. Barloworld was founded in 1902 and as of the 2010 financial reporting period, the group had operations in 38 countries with approximately 60 per cent of the 18 000 employees based in South Africa and total assets valued at \$3,683 billion.¹ The group is a distributor of brands that provide rental, fleet management, product support, and logistics solutions. The key divisions of the group include Equipment, Automotive, Handling, and Logistics. Barloworld represent brands that include Caterpillar, Hyster, Avis, Audi, BMW, Ford, General Motors, Mercedes-Benz, Toyota, Volkswagen, and others.

Although the Barloworld group is not a major consumer of energy and/or natural resources, nor is it a major emitter of greenhouse gases (GHGs), its products are; and it takes environmental concerns seriously since this will impact on its operations. In this context, Barloworld strives to be a responsible corporate by reducing its own environmental footprint as well as the environmental impact of its customer solutions. 'Climate change and environmental considerations are core components of the group's ethos of responsible corporate citizenship'.² Informed by the environment³ and climate change⁴ policies, the group strives to measure and report the aspects of its business that contribute to climate change.⁵ The group also strives to reduce, minimise and offset carbon emissions from its operations. The 2009 Climate Change Policy laid the basis upon which Barloworld would set appropriate targets and implement initiatives, once reliable base-lines were set for applicable indicators.

In 2009 Barloworld agreed to a target of a 12 per cent non-renewable energy and carbon emissions efficiency improvement by the 2014 financial year end, off the 2009 baseline year.⁶ The GHG emissions measured 201 733 tonnes of carbon dioxide equivalent (CO₂e) in 2010, 199 053 tonnes CO₂e in 2009, and 208 043 tonnes CO₂e in 2008.⁷ From an international compliance perspective, Barloworld adopted the GHG Protocol Corporate Accounting and Reporting Standard⁸ and delineated CO₂ as the only GHG with material significance.⁹ Each division discloses the list of their operations included in the GHG emissions inventory according to the GHG Protocol. In as much as Barloworld acknowledges the wider context of its carbon footprint, the group has been focusing on the mandatory Scope 1 and Scope 2 emissions in its reporting. However, limited Scope 3 emission sources were integrated into the group's accounting from 2010. Details regarding the categories spelt out for the group are shown in Table 14.1.

Table 14.1 Barloworld GHG Emissions Measured and Reported

Scope	Nature	Sources
1	Direct emissions occurring from sources controlled by Barloworld operations. This includes stationary and mobile combustion of fossil fuels.	From heating and cooling of facilities, and on-site electricity generation. Mobile combustion from automobiles, trucks and automotive equipment.

Scope	Nature	Sources
2	Indirect emissions from electricity.	Mainly from purchased electricity consumed by operations.
3	Other indirect emissions.	Customer use of vehicles from South African car rental operations. Those generated by air travel undertaken by employees for business purposes.

Source: Author¹⁰

LOW CARBON AND GREEN ECONOMY IN THE LOGISTICS INDUSTRY

When considering low carbon and green economy in the logistics industry similar to that of Barloworld, it becomes inevitable that issues of green logistics and supply chains be discussed. Logistics refers to the 'transportation, storage and handling of products as they move from the source of raw materials, through the manufacturing system to their final point of sale'.¹¹ Greening logistics (sustainable logistics or smart logistics¹²) is a phenomenon that is ever growing both in South Africa and internationally. Thiell et al define green logistics as consisting 'of all activities related to eco-efficient management of forward and reverse flows of products and information between the point of origin and the point of consumption whose purpose is to meet or exceed customer demand'.¹³

From transportation, green logistics would focus, among other things, on clean vehicles, re-use of containers, freight consolidation, standardisation of trucks' sizes, and the reduction of carbon dioxide (CO₂) emissions. In terms of warehousing, this would imply, among other things, clean material handling equipment, re-conditioning and re-use of containers, automation of systems, and minimisation of inventories.¹⁴

A number of drivers for green logistics can be identified, among them: mounting energy costs; worldwide alarms among corporates over GHG emissions; global warming leading to climate change; regulations (be it voluntary or command and control); and improved community awareness of environmental issues.¹⁵ However, there are challenges associated with green logistics such as lack of information on green supply chains, and the emergence of global sourcing making tracing of an end-to-end supply chain carbon footprint difficult.¹⁶

In 2007 Eye for Transport undertook its first survey on Green Transport and Logistics. The survey managed to get responses from 271 senior executives in the transportation and logistics industry.¹⁷ The major drivers for greening transportation and logistics were identified as: having these as 'part of a larger corporate responsibility agenda; increasing supply chain efficiency; decreasing risk; decreasing your fuel bill; improving investor relations; improving public relations; improving customer relations; and government compliance'.¹⁸ From ongoing and planned initiatives in the green transportation and logistics sectors, the following emerged (ranked from most popular to least):

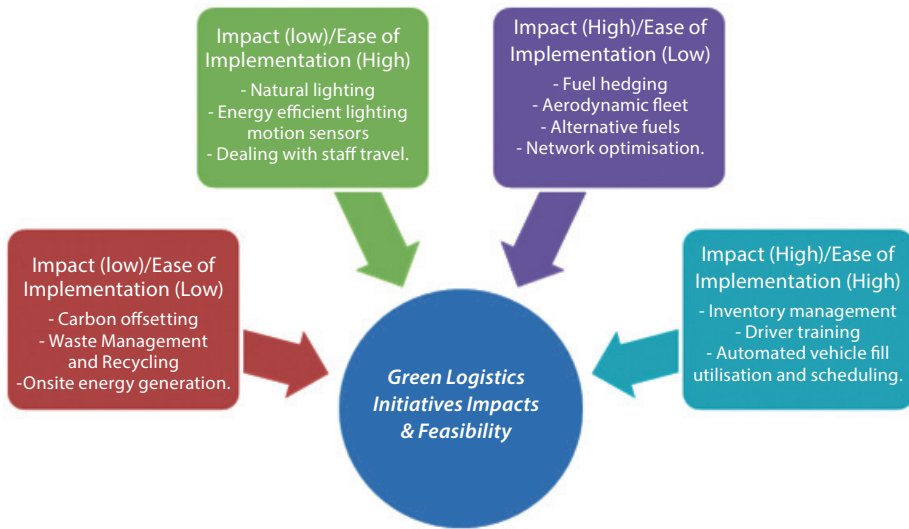
...improving energy efficiency; strategic warehouse design and selection; vehicle re-routing to reduce mileage; emissions measuring and/or reductions; trialling and/or use of alternative fuels; using more environmentally friendly logistics providers; and moving freight away from air towards other modes.¹⁹

Accenture draws a list of activities towards reducing GHG emissions in green logistics and plot these in four quadrants based on their ease of implementation and impact. The four quadrants that emerge are:²⁰ Impact (low)/Ease of implementation (Low); Impact (Low)/Ease of implementation (High); Impact (High)/Ease of implementation (Low); and Impact (High)/Ease of implementation (High). The details with regards to the initiatives are shown in Figure 14.1. From Figure 14.1, one discovers that the low hanging fruits (early harvest) in terms of green logistics are in inventory management, driver training, as well as automated vehicle fill utilisation and scheduling.

In 2010, Imperial Logistics provided some insights into its Green Logistics Strategy. The strategy provides an account of benefits associated with green logistics. The benefits include reduction in CO₂ emissions, cost savings, and boosted business performance.²¹ The strategy provides a three-stage framework in moving supply chains to be greener and this involves: awareness, carbon auditing and identifying change drivers, as well as embarking on business case justified initiatives. In addition, greening of operations should also be acceptable financially, environmentally, and socially.

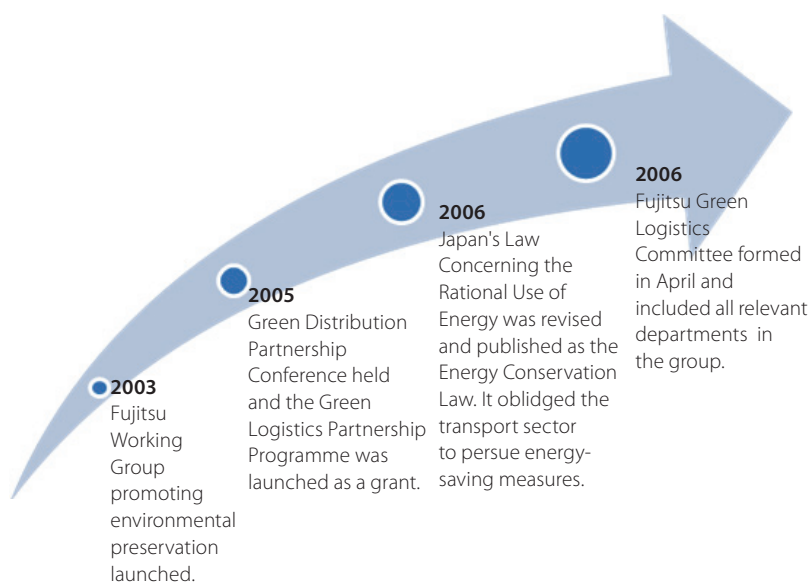
In greening its operations, Imperial Logistics South Africa invested in vehicles equipped to Euro V emission standards. As part of Imperial Logistics' low carbon economy journey, a number of initiatives were put in place such as having all fuel used in their Fast 'n Fresh operation containing 5 per cent 'bio-diesel', use of borehole water for fleet wash, and recycling wash water. Furthermore, bio-degradable detergents are used in cleaning. Informed by experiments, vehicle specifications that are 6 per cent more fuel efficient are purchased as part of the standard for group-wide new vehicles acquisitions.²²

On 7 June 2011, Imperial Cargo's Paarl-based headquarters were reported to have switched to the new solar power system. Imperial Cargo spent two years transforming a dump site into a green energy site. The headquarters accommodates 120 employees, hosts a 2 000m² warehouse, a wash bay, and workshop with nine bays.²³ It also harnesses natural power, light, and ventilation. The photovoltaic installation in the Western Cape was the largest at that time. Solar power, in excess of 30 461 kWh annually, is generated and this will be realised for the next 20 years.

Figure 14.1 Green Logistics Initiative Impacts/FeasibilitySources: Author²⁴

In late 2005, Wal-Mart set ambitious goals documenting this group's new sustainability initiative, thereby opening the route to becoming the world's most competitive and innovative corporate. Three goals were spelt out and these were:²⁵ to be supplied with 100 per cent renewable energy in the very near future, to create zero waste, and to sell products that sustain Wal-Mart's resources and the environment. To this end, Wal-Mart set a target to increase fuel efficiency in its trucks by 25 per cent by 2008, and increasing it two folds within 10 years. The group also spelt out targets to reduce GHGs by 20 per cent in seven years; have all stores reduce energy consumption by 30 per cent in seven years; and cut solid waste from American stores by 25 per cent in three years. Saving close to \$75 million in fuel costs and the removal of about 400 000 tonnes of CO₂ were realised in a single year. Today Wal-Mart is recognised as among the pioneers of the low carbon and green economy in its sector.²⁶

Fujitsu is one of the global players that have embraced green logistics. This has mainly been driven by the revision of the Japanese Energy Conservation Law in April 2006.²⁷ The revised law requires transporters and shippers to make efforts to protect the environment in logistics activities. Fujitsu has set tough targets for the supply chain as it stipulated its target to reduce GHG emissions by 30 per cent by the reporting period in 2010 based on the 2000 reporting year. One of the flagship programmes for the group has been the use of an intensive vehicle-allocation control system from parts procurement to product delivery in the Tokyo metropolitan through modal shift expansion and the green Logistics Partnership Promotion Project. Some of the timelines, enablers and drivers in Fujitsu transition to green logistics are indicated in Figure 14.2.

Figure 14.2 Timelines, enablers and drivers in Fujitsu green logisticsSource: Author²⁸

A number of other logistics companies in Japan also spelt out their GHG emissions reduction targets in response to the Green Logistics Partnership Programme with 2010 as the target year. Niwa indicates that²⁹ one other company set the same target as Fujitsu, the other 4 per cent based on real production unit, another 25 per cent based on real production unit and the last reported on, 4 per cent based on basic unit. To implement the Green Logistics Partnership Project within its operations, Fujitsu instituted activities that included: rationalisation of distribution centres; standardisation of shipping instructions based on fixed rules; revision of operations systems among logistics partners to optimise vehicle allocation; and further reduction of GHG emissions through the use of Fujitsu logistics solutions. Full scale implementation began in February 2007.

THE BUSINESS CASE AT BARLOWORLD

The drivers and business case to have Barloworld take the route of ensuring sustainability through strategy to move towards a low carbon and green economy responsive corporate fall under three categories. These categories essentially are: organisational reputation; internal cost savings; and the need to open up business opportunities. The categories raised here apply to both domestic and international operations of Barloworld.

Organisational reputation stands out as the key aspect of the group's value creation capability. Organisational reputation draws from both the external and internal

perspectives. From the external front issues such as credibility with stakeholders; being perceived as a responsible corporate; being perceived as an organisation that is able to create long term value for all stakeholders; reducing perceived risks for the organisation with concomitant benefits in the financial and other markets; acceptance by various investment funds and stock exchange indices (for example, the Johannesburg Stock Exchange Socially Responsible Investment (JSE SRI) Index;³⁰ and becoming attractive from a customer, supplier, principal, and potential employee perspective. From the internal perspective issues include: Employee Value Proposition (i.e. attracting and retaining employees); increased pressure from employees who require their employers to be responsible corporate citizens; and other 'green' demands from stakeholders.

Internal cost savings emerged as the second category for the business case. Internal cost savings are essentially driven by the need to enhance energy usage and efficient consumption of natural resources. Both these aspects underpin Barloworld's transition to a low carbon and green economy. More efficient energy consumption, especially from that which is fossil based, assists in mitigating the cost of any current and future carbon taxes.³¹ These initiatives are not only environmentally responsible activities, but they also have commercial benefits and enhance the group's operational resilience.

Commercial benefits also arise from reduced consumption that has cost benefits, and when coupled with rapidly increasing energy price increases, make such savings even more pronounced. Cost associated with any carbon tax would also be mitigated. Operation resilience is enhanced as measures are taken to reduce consumption and reliance on natural resources such as fossil fuels and water. The measures are also viewed as safety nets to the organisation with regards to energy shortages. As Barloworld progresses with such efficiency improvement initiatives, its resilience is enhanced and its risk profile reduced. Another add-on in terms of effective and efficient cost savings is the possibility of reducing insurance premiums and lower cost of capital.

The desire to keep opening up more business opportunities featured as the third category for the Barloworld business case to move towards a low carbon and green economy. Business opportunities arise from gaining a competitive advantage in current customer offerings and solutions, as well as the creation of brand new opportunities. Through gaining a competitive advantage in current customer offerings and solutions, the group has an opportunity to distinguish itself from its competitors by providing products, solutions and technology that assist customers address their respective environmental/societal goals and objectives, as well as their commercial activities. These in turn reduce the customers' environmental and carbon footprint and costs.

With regards to new business opportunities, 'green industries' such as renewable energy and energy efficiency could emerge and have emerged. For South Africa, these 'green industries' could be supported by beneficial finance and complement the nation's job creation, socio-economic development, as well as enterprise development imperatives. The initiatives could also benefit from anticipated legislation, policies and regulation in South Africa which is aimed at encouraging such industries.³²

BARLOWORLD'S ENABLERS

Barloworld's defining characteristic in terms of enablers towards a transition to a low carbon and green company is its integrated approach addressing environmental (including climate change), social, and financial needs. To this effect, the group has a longstanding VBM approach.³³ The VBM approach addresses long term value creation for all the group's stakeholders and the goal of being a responsible corporate citizen. Barloworld has entrenched a sustainable development culture into its strategy by identifying it as one of the six Strategic Focus Areas (SFAs). An executive director has been appointed to oversee this, as well as a group executive with responsibility for both strategy and sustainability. Sustainable development has been integrated into all operations through aligned strategic plans in terms of which all operations are required to address the group's strategic focus areas (including sustainable development) and a performance management system that addresses performance in terms of the groups strategic focus areas, related performance scorecards and rewards (including incentives).

Among the relevant group policies and frameworks that present a platform enabling the transition to a low carbon and green company is included the following:

- Value Base Management Philosophy³⁴ (as already highlighted)
- Code of Ethics (that includes the protection of the environment clause)³⁵
- Barloworld's 10 Pillars of Sustainability (that includes a pillar on Environmental and Social Legitimacy which talks about Barloworld's vision to reduce its environmental impacts and carbon accountability)³⁶
- Signatory to the Energy Efficiency Accord of South Africa³⁷
- Group Strategic Triangle³⁸
- Barloworld Climate Change Policy
- Barloworld Environmental Policy.³⁹

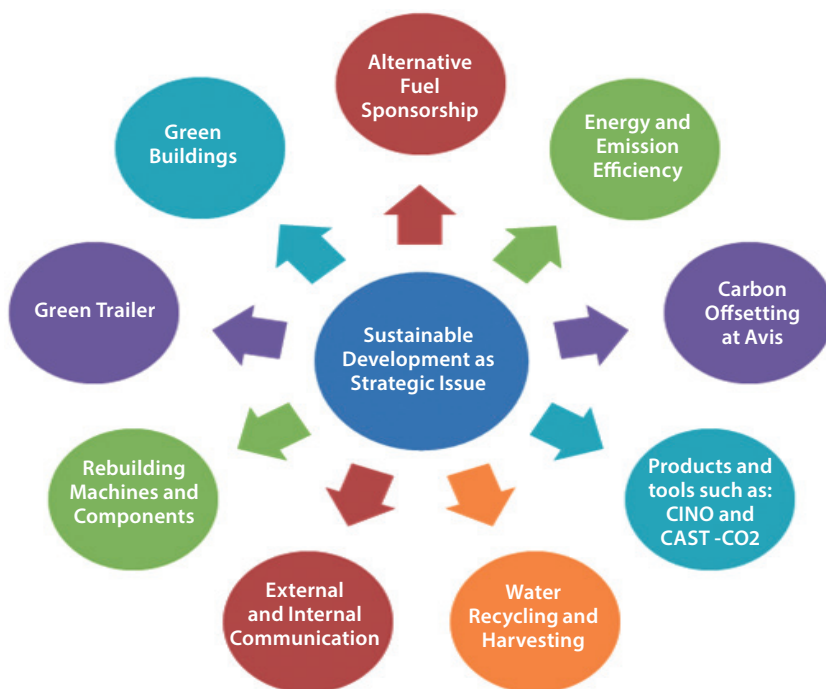
In addition to the relevant group policies and frameworks, Barloworld has instituted hands-on initiatives directly linked to sustainable development. Aspiration energy and emission targets were outlined with a monitoring system that includes measurement tools. The measurement tools are available throughout the group to allow measuring, reporting, and verification of progress against set targets and facilitate continuous improvements. The group follows a system of structured data collection. An entrenched reporting system that covers elements of sustainable development include: regular review at management meetings; quarterly review at Risk and Sustainability Committee meetings; and annual review and reporting.

Other measures in the group resulted in the appointment of sustainability champions in all divisions. There is also representation at board and group executive level as well as commitment by group and divisional chief executive officers (CEOs). Barloworld's sustainable development vision is aligned with leading principals (that include

international original equipment manufacturers like Caterpillar, BMW, Mercedes, Audi, Toyota, Volkswagen, and Hyster) who have their own sustainable development objective. Some of the original equipment manufacturers' low carbon and green economy objectives address emission reductions, energy efficiency and water conservation. Furthermore, regular internal and external communication initiatives have been initiated, as well as including sustainable development in the group's Leadership Development and Executive Development programmes. Barloworld actively participates in business forums, discussion groups and representative institutions that address matters pertaining to low carbon and green economy like the National Business Initiatives and JSE SRI Index forums. Overall, the documented initiatives have created high levels of awareness in the company, facilitating transition to a low carbon and green economy.

FLAGSHIP BREAKTHROUGH AT BARLOWORLD

The identification of sustainable development as a strategic issue for the Barloworld group to bring environmental, reputational and commercial benefits, and to create sustainable value for all its stakeholders, stands out as the breakthrough. Barloworld's defining characteristic in this regard is the integrated nature of its approach. To enhance the group's VBM approach, operational plans are put in place together with stakeholders that include principals in order to deliver on the strategies. Ultimately the operational plans assist the group's transition to low carbon and green economy. The operational plans and initiatives address, among other key issues: climate change mitigation, adaptation, technology transfer (including research and development), capacity building and awareness, and the improvement of financial returns to the company. Barloworld also fully understands the value of small incremental measures. Stakeholder engagement, underpinned by principles of materiality, inclusiveness and responsiveness, highlights material issues, and integrated reporting that informs stakeholders of progress. In addition, responsibility and accountability for strategy and sustainability at board level ensure attention and focus which is supported by on-going reporting and review. A summary of operational initiatives linked to the breakthrough flagship for Barloworld is shown in Figure 14.3.

Figure 14.3 Barloworld's networked operational plans and initiatives

Source: Author

The low carbon and green economy initiatives identified in Figure 14.3 (all of which draw from the Barloworld's sustainable development entrenchment vision) will each be discussed in turn, starting with the energy and emissions efficiency initiative. Each of the initiatives addresses five key issues namely: the broad theme, key aspects, outcomes, benefits, and coverage in terms of the Barloworld group's operations.

The *energy and resulting emission efficiency improvements* aims at reducing Barloworld's energy consumption and emissions against a business as usual scenario.⁴⁰ The key aspects aim to achieve a target of 12 per cent energy efficiency on non-renewables by the 2014 financial year end, based on the 2009 baseline. The group has adopted a similar approach for emissions (Scope 1 and Scope 2). The projected outcome is energy and emissions efficiency improvements being entrenched into Barloworld's strategic planning processes. Energy and emissions efficiency will also be embedded in the operational management of the company through measurement, reporting and the inclusion of performance management and reward structure. The benefits include reduced energy consumption and related savings, as well as reduced risks from environmental damage and climate change. The initiative cuts across the group in all areas of operation.

Barloworld Logistics developed *CINO* (*Combined Inventory and Network Optimisation*) and *CAST-CO₂* modelling tools which support its low carbon offering. The broad theme is

to provide products and services that bring on-board its customers in terms of sustainability.⁴¹ The Combined Inventory and Network Optimisation (CINO) tool allows companies to plan supply and demand across the distribution networks. This involves planning for supply chains to reduce their carbon footprints. The CINO tool's parameters are based on the GHG Protocol. The benefits accruing from CINO and CAST-CO₂ include enhanced reputation and responsible corporate social responsibility, competitive advantage, and access to new commercial opportunities. The CINO and CAST-CO₂ tools have a global application and can easily handle the complexity of global end-to-end supply chains.

External and Internal Communication is also among the initiatives highlighted in Figure 14.3. This has many aspects. Barloworld has developed communication strategies to facilitate the implementation of this initiative. The group has been recognised for this initiative and received both the Platinum and Gold Awards during the Carbon Disclosure Project (CDP) 2010 ceremony in South Africa.⁴² Barloworld also featured among the top four companies in the CDP Leadership Index and Performance Rating in 2010. The CDP works with the top 100 JSE listed companies. The group uses employee communications to drive behaviour change with the hope that this will lead to energy savings. Barloworld has appointed sustainability champions in each division to measure, monitor and verify emissions. The sustainability champions are managed through an integrated performance scorecard system. Communication on initiatives is managed through a number of platforms including 'green' community of practice meetings, screen savers, posters and exhibitions. The benefits realised through the external and internal communication initiative include external stakeholder awareness and responsible corporate social responsibility; awareness and commitment from employees; reduced energy consumption and related savings; and reduced risks from environmental and climate change.

Barloworld Equipment and Handling divisions have initiatives on *Rebuilding Machines and Components*. The broad theme for this Equipment Division initiative is reducing demand for non-renewable resources and energy.⁴³ Re-manufacturing rejuvenates end-of-life components to their original condition, and is one mini-breakthrough in the division. This leads to reductions in waste and minimisation of the need to take up raw materials during manufacturing. Close to 50 Caterpillar machines were rebuilt through this initiative in 2010 alone. Engine and drive-train components are rebuilt in two Component Rebuild Centres (CRCs) in Isando and Boksburg respectively, in South Africa. In the same year, 2010, more than 500 engines were rebuilt and almost 3 000 components were repaired. The group expects component and machine rebuild throughput to more than double by 2015. The realised benefits have been enhanced reputation and responsible corporate social responsibility; competitive advantage; and reduced demand for non-renewable resources.

As indicated earlier, Barloworld Handling's initiative on *Rebuilding Machines and Components* and has spelt out the same broad theme for the Equipment division.⁴⁴ The Hyster's truck re-manufacturing process recovers some 50 per cent of original components while its rebuild engines are 50 per cent to 67 per cent more efficient in terms of energy

and labour respectively. Approximately 90 per cent of a scrapped lift truck can now be reclaimed. The benefits from rebuilding machines and components in this division are the same as those realised under the Equipment division. The regions covered under this initiative include South Africa, Europe and UK, as well as North America.

Barloworld Logistics has put in place the *Green Trailer initiative*.⁴⁵ The new long haul 'Green Trailer' stands out as an excellent example of a product and customer service innovation. The Green Trailer is an aerodynamically designed truck and its trailer, transporting goods from Johannesburg to Durban (Figure 14.4). The breakthrough is that the Green Trailer has effected at least a 10 per cent fuel saving and resultant emissions savings. Barloworld Logistics has been recognised for this and won the Enviro Award at the 2010 Annual Logistics Achiever Awards, as well as a green supply chain award. The benefits have enhanced reputation and responsible corporate citizenship; reduced energy consumption and related savings, reduced risks from environmental and climate change; and enhanced competitive advantage. The Green Trailer initiative is running only in the South African logistics operations.

Figure 14.4 The Green Trailer Initiative



Source: Supplied by Lauren Bobbert, 10 October 2011 (Communication & Marketing Officer, Barloworld)

Another green initiative of importance relates to the green buildings. Under the *Green Buildings (General)* branding, the group aims to reduce energy consumption and emissions against a business as usual scenario.⁴⁶ The initiative has resulted in the installation of efficient lighting systems and air-conditioners, use of geyser blankets, motion sensors, and time switches. Barloworld continuously retrofits for energy efficiency across its facilities globally (including South Africa and Africa). Examples of Green Building

initiatives include: the group corporate office (Barlow Park) in Sandton, South Africa. The corporate office won a bronze prize in the inaugural Energy Cybernetics Energy Barometer Awards in June 2010. The competition was entered by 16 major South African companies. Barloworld Power/Energy Cybernetics has installed PowerWatch technology in a number of South African operations to provide real-time electricity consumption. The benefits realised through these initiatives include enhanced reputation; responsible corporate social responsibility; reduced energy consumption and related savings; as well as reduced risks from environmental and climate change. The BMW dealership (Club Motors Fountains) is recognised as a unique initiative in this space (see Box 14.1).

Box 14.1 BMW Dealership, the Club Motors Fountains in Pretoria

Barloworld also has a special Green Buildings initiative at a BMW dealership, the Club Motors Fountains in Pretoria, South Africa. The dealership is part of the group. Club Motors Fountains is the first BMW dealership to roll out energy saving technologies in its new facility. Club Motors Fountains has carefully planned and designed its new premises to ensure that every aspect of the facility is constructed in such a way to save energy and be as environmentally responsible as possible. The main energy-saving elements include the utilisation of high-efficiency lighting systems with motion sensors, and properly sized energy-efficient heating and cooling systems, all in conjunction with a thermally-efficient building shell. Whilst the construction methods and technologies used cost more up front, the end result was well worth the investment with much lower operating costs over the entire life span of the building. Some of the interesting energy saving and green recycling elements that were utilised during the construction of the dealership include: a north-facing design that improves light infiltration and harnesses solar energy; the shape of the building provides the most natural light, maximising shade in the summer, and heat as well as natural light in the winter; alternative energy sources such as photovoltaic and fuel cells were considered in the construction of the dealership; recycled construction materials and other materials with zero or low harmful air emissions, zero or low toxicity and durable local materials were used as far possible; and dimensional planning reduced the amount of building materials needed as well as construction costs. To ensure water efficiency, the designs included dual plumbing which uses recycled water for toilet flushing as well as a grey water system that recovers rainwater or other non-potable water for site irrigation. Waste water is minimised by using low-flush toilets, low-flow shower heads and other water conserving fixtures. The use of state-of-the-art irrigation controllers and self-closing nozzles on hoses contribute to water efficiency.

Source: Whitaker 2011⁴⁷

The *Carbon Offsetting Programme at the Avis Rent a Car South Africa* is one of the initiatives. In 2009 Avis Rent a Car South Africa achieved a CarbonNeutral status through offsetting internal fuel and energy emissions.⁴⁸ To this end, an estimated 33 000 tonnes of CO₂e emissions have been offset. Carbon credits were bought from Voluntary Carbon Standard (VCS) projects. These VCS projects include Hufu waste heat recovery project in China, Govinderpuram wind power project in India, Unchindle-Mapanda re-forestation project in Tanzania, Tieling coal mine methane project in China, and Maharashtra wind power project in India. The major benefits anticipated include leading industry practice, internal and external reputation enhancement, and competitive advantage.

Through the 2010 Protocol for Accounting and Reporting on Water Use and Management, Barloworld,⁴⁹ the group embarked on a water recycling and harvesting initiative at Avis Car Rental. Its *Water Recycling and Harvesting* is a major green economy

issue⁵⁰ in the business unit, and key aspects cover moving towards being water neutral. This encompasses dependence on sufficient rainfall, and this has resulted in Avis Car Rental operations at Cape Town International Airport being water neutral. The operations include a 180 000-litre submerged storage tank harnessing rainfall, saving up to 40 million litres of water per year. The business unit currently saves some 75 million litres of water annually due to water recycling activities at Johannesburg, Cape Town and Durban facilities. The realised benefits are cost savings, reduced consumption of scarce resources, and operational resilience.

Alternative Fuel Sponsorship is one of the initiatives also falling under Avis Car Rental in South Africa.⁵¹ The solar race attracts alternative energy technology vehicles to the country. One such race took place in South Africa 2010 and attracted players from Germany, Japan, Iran, and South Africa where the teams built their own cars.⁵² The benefits from this initiative include enhanced reputation; responsible corporate social responsibility; and reduced demand for non-renewable resources.

KEY CHALLENGES

The Barloworld group seems not to have had major challenges in their quest to transform into a low carbon company and address the dictates of the green South African and global economy. As discussed in this chapter, sustainable development was easily identified as one of the group's six Strategic Focus Areas. However, the challenges that required attention were, and still are, around the institutionalising of accountability for economic, social and environmental issues in the day-to-day management structures. This includes:

- Establishing and entrenching robust, efficient and credible data collection and integrated reporting systems. This requires group policies and reporting protocols.
- Incorporating into existing performance management and reward systems.
- Establishing appropriate governance and reporting structures.
- Allocating adequate resources.

Hence, once the strategic relevance of the initiatives has been identified and accepted, there are no challenges other than normal operational issues that need to be addressed. Aligning the Barloworld group initiatives with national as well as international low carbon and green economy objectives is important. Accordingly, clear and definitive goals, objectives, and guidelines need to be established in this regard. This includes any envisaged reporting which needs to be aligned and to be consistent. Lastly, an appropriate balance between the interests of all stakeholders is crucial, as this can easily derail good innovation within the context of the subject under discussion in this book and in the case study.

FUTURE LOW CARBON AND GREEN ECONOMY INITIATIVES

Barloworld will continue to review these low carbon and green economy initiatives in terms of its VBM approach, strategic importance, and stakeholder requirements. It is anticipated that green economy (including low carbon) initiatives at the group will grow and assist customers to meet their own sustainable development standards. Such standards include mainly energy and emission efficiencies, as well as customer and product safety. The group also plans to continue with its rebuilding and remanufacturing initiatives so as to minimise the consumption of raw materials. In a message of the 2011 World Environment Day, the Barloworld CEO wrote:

I am convinced that we can greatly enhance the sustained competitiveness of our businesses by: focusing on developing products and services that capitalise on environmentally sustainable business opportunities; realising cost savings through energy efficiency and other environmentally sustainable business practices; and enhancing Barloworld's reputation by leading in environmentally sustainable development.⁵³

Other planned initiatives include supply chain optimisation to reduce energy usage, emissions, storage, and handling inefficiencies; and minimising and reducing carbon footprint and offsetting where appropriate in terms of the group's MARSO (Measure, Avoid, Reduce, Switch, and Offset) approach. Hence, it is anticipated that careful water usage, efficiency improvement and recycling will continue. Greening Barloworld buildings has been set as a long term and possibly lifelong adventure and this will be applied to both new and existing facilities. The group also envisage a situation whereby there will be continued and sustained drive for internal aspirational targets for energy and emission efficiency and realising associated cost savings. Cost savings will be realised through efficient use of natural resources that also include water as one of the emerging green economy issues in South Africa. The launch of the CDP Water in 2010⁵⁴ has just proved the importance of water as a strategic issue moving forwards.

CONCLUSION

This case study clearly reveals that the Barloworld group has fully embraced the low carbon and green economy. Recognition from peers with regards to climate leadership speaks volumes in terms of the manner in which the group has operationalised its breakthrough vision of having sustainable development as a strategic issue. The initiatives put in place by Barloworld that include: Energy and Resulting Emission Efficiency Improvements; CINO; CAST-CO₂; External and Internal Communication; Rebuilding Machines and Components; Green Trailer; Green Buildings; Carbon Offsetting Programme at the Avis Rent a Car; Water Recycling and Harvesting; and Alternative Fuel Sponsorship are all

aligned to good international practices, as reflected by the literature reviewed as background to this chapter. In terms of the key drivers for transition to low carbon and green economy, Barloworld identified organisational reputation, internal cost savings, and the need to open up new business opportunities. As for the enablers, in addition to identifying sustainable development as a strategic issue, other enablers include: Value Base Management Philosophy; the Code of Ethics; Barloworld's 10 Pillars of Sustainability; being a signatory to the Energy Efficiency Accord of South Africa; the Barloworld's Strategic Triangle; Climate Change Policy; and Environmental Policy. However, it should be noted that maintaining momentum into the future remains key if Barloworld is to remain a leader in this space.

NOTES AND REFERENCES

- 1 Barloworld., 2010. Barloworld Annual Report 2010. Sandton: Barloworld South Africa (Pty) Limited.
- 2 Barloworld. 2011. Growth 2015. Sandton: Barloworld South Africa (Pty) Limited.
- 3 Barloworld. 2009a. Barloworld Climate Change Policy. Sandton: Barloworld South Africa (Pty) Limited.
- 4 Ibid.
- 5 Ibid.
- 6 Barloworld., 2011. Op Cit.
- 7 Barloworld., 2010. Op Cit.
- 8 WBCSD and WRI., 2004. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition). Washington DC: World Business Council for Sustainable Development and World Resources Institute.
- 9 Barloworld., 2010. Application of the GHG Protocol for Accounting and Reporting of GHG Emissions as a Consequence of Business Operations. Sandton: Barloworld South Africa (Pty) Limited.
- 10 Ibid. pp. 2–3.
- 11 TATA Consulting Services., 2010. Green Logistics. London: TATA Consulting Services.
- 12 The Climate Group., 2008. SMART 2020: Enabling the Low Carbon Economy in the Information Age. London: the Climate Group.
- 13 Thiell, M. Zuluaga, J. P. S. Montañez, J. P. M. and Van Hoof, B., 2011. Green Logistics: Global Practices and their Implications for Emerging Markets. Colombo: Universidad de los Andes, Colombia. p. 1.
- 14 Ibid.
- 15 TATA Consulting Services., 2010. Op Cit.
- 16 Ibid.
- 17 Eye for transport., 2007. Eye for Transport's Green Transport and Logistics Report July 2007. London: eye for Transport.
- 18 Ibid.
- 19 Ibid.
- 20 Artkinson, R., 2008. Driving Green Logistics: Practical Actions When Opex is Tight. London: Accenture (Powerpoint Presentation).
- 21 Imperial Logistics., 2010. Green Logistics Strategy. Johannesburg: Imperial Logistics.

- 22 Ibid.
- 23 Venter, I., 2011. Imperial Cargo HQ switches on solar power system. Available at <http://www.engineeringnews.co.za/article/imperial-cargo-hq-switches-on-solar-power-system-2011-06-07> [Accessed 20 October 2011].
- 24 Artkinson, R., 2008. Op Cit.
- 25 Heying, A. and Sanzero, W., 2009. A Case Study of Wal-Mart's 'Green' Supply Chain Management. Washington D.C: Wal-Marts.
- 26 Ibid.
- 27 Niwa, K., 2009. Fujitsu Activities for Green Logistics. *Fujitsu Science Technology Journal*, 45(1), pp. 28–32.
- 28 Ibid.
- 29 Ibid.
- 30 Johannesburg Stock Exchange., 2010. JSE SRI Index Background Selection Criteria. Johannesburg: Johannesburg Stock Exchange.
- 31 South African National Treasury., 2010. Carbon Tax Option in 2010. Pretoria: South African National Treasury.
- 32 DTI (Department of Trade and Industry)., 2010. The 2010/11--2012/13 Industrial Policy Action Plan (IPAP II). Pretoria: Department of Trade and Industry.
- 33 Barloworld., 2010. Op Cit.
- 34 Ibid.
- 35 Barloworld., 2006. Barloworld Code of Ethics. Sandton: Barloworld South Africa (Pty) Limited.
- 36 Barloworld., 2009b. Barloworld 10 Pillars of sustainability. Sandton: Barloworld South Africa (Pty) Limited.
- 37 NBI (National Business Initiative) and (DME) Department of Minerals and Energy., 2006. Energy Efficiency Accord. Johannesburg/Pretoria: NBI and DME.
- 38 Barloworld., 2010. Op Cit.
- 39 Barloworld., 2009b. Op Cit.
- 40 Whitaker, C., 2011. Barloworld Aspirational Targets: Energy and Resulting Emissions Efficiency Improvements. Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 41 Whitaker, C., 2011. CINO (Combined Inventory and Network Optimisation) and CAST-CO₂ (Barloworld Logistics). Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 42 Whitaker, C., 2011. External and Internal Communication. Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 43 Whitaker, C., 2011. Rebuilding Machines and Components (Barloworld Equipment). Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 44 Ibid.
- 45 Whitaker, C., 2011. Green Trailer (Barloworld Logistics). Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 46 Whitaker, C., 2011. Green Buildings (General). Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 47 Whitaker, C., 2011. Green Buildings (BMW Dealership, the Club Motors Fountains in Pretoria, South Africa). Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).

Chapter 14

- 48 Whitaker, C., 2011. Barloworld Carbon Offset Programme (Avis Rent a Car South Africa). Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 49 Barloworld., 2010. Application of the Protocol for Accounting and Reporting of Water Use and Management as a Consequence of Business Operations.
- 50 Whitaker, C., 2011. Avis: Water Recycling and Harvesting. Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 51 Whitaker, C., 2011. Alternative Fuel Sponsorship. Sandton: Barloworld South Africa (Pty) Limited (personal communication, 6 October 2011).
- 52 Barloworld., 2010. Op Cit.
- 53 Barloworld., 2011. Op Cit. p. 5.
- 54 CDP (Carbon Disclosure Project)., 2010. Carbon Disclosure Project Water 2010 South Africa. Johannesburg: National Business Initiative.

Pick 'N Pay's supply chain connectivity, food security and the green economy

Godwell Nhamo

ABSTRACT

Pick 'N Pay believes that its transition to a green economy (inclusive of low carbon) is driven by the six sustainability focus areas that the group has determined. The group believes that all the initiatives linked to the sustainability focus areas are important in having Pick'N Pay move towards a green economy. The group realises that it is better positioned to influence other aspects of the green economy that include incentivising green agricultural practices, supporting sustainable small-holder agriculture, moving towards green logistics, creating markets for greener and more sustainable products, and influencing consumer choices through product offering. Details on how the sustainability focus areas relate are the subject of discussion in this chapter.

INTRODUCTION

Pick 'N Pay's supply chain connectivity and food security are documented as the breakthrough for the group. Pick 'N Pay believes that its transition to a low carbon and green economy is driven by the six sustainability focus areas that include, among them, promoting a clean and healthy environment. The Pick 'N Pay green Designated National Authority (DNA) has a long history. In 2003, the retail group became a forerunner in terms of introducing the green shopping bag, following the introduction of the Plastic Bags Regulations in South Africa.¹ Part of the proceeds from the sales of the green bags has been channelled towards the Kids in Parks Programme, jointly implemented with the Department of Basic Education. Such initiatives have witnessed a growing green agenda at Pick 'N Pay. The aim of this research is to bring to light the climate change initiatives of Pick 'N Pay and bring them to the fore as a beacon from where standards of achieving carbon neutrality can be followed by peers and other firms in other industrial sectors of

the economy. In this regard, an attempt to conceptualise and document the Pick 'N Pay business case of a transition to low carbon operations was done. Pick 'N Pay is currently pursuing a number of initiatives to tackle climate change issues, and ensuring a green economy vision is achieved in South Africa.

LOW CARBON AND GREEN ECONOMY IN THE FOOD AND RETAIL SECTOR

There are five drivers² to transition to a low carbon company especially by the food and retail sector. The drivers include: energy prices, market shifts, regulation and government directives, investor pressure, and technological change. The food and retail sector also faces three challenges encountered in promoting sustainability and low carbon emissions. The challenges include a weak policy set up, lack of articulate government action on climate change, and uncertainty about the marketplace. The points raised here are generic as they also affect all other case studies raised in this book.

The lack of strong policy signals means that companies may not pin down their decisions to respond to climate change challenges.³ It is extremely difficult for a company without a strong policy framework⁴ to justify to its board of directors and/or investors a need for upfront investments required when one moves towards low carbon technologies. There is another dimension in terms of challenges. This comes from the manner in which successive governments abide with existing low carbon and climate change policies. Such policies form the basis upon which governments are monitoring the corporate sector on investments made to mitigate and adapt to climate impacts. The pull aspects on why the corporate food and retail sector may choose to go low carbon are presented in Box 15.1. Five such key motivations can be identified.

Box 15.1 Motivations for a low carbon food and retail sector

Profit: It would appear that many managers feel as though this is the only way to communicate the need for climate action to their employees. The need to make an economic case for corporate climate action is now almost a slogan in the business community.

Credibility in climate policy development: Being proactive and pioneers in undertaking climate activities, a company gains credibility and leverage that enables them to play active roles in deciding the exact direction of climate change.

Fiduciary obligation: Most managers now feel that it is part of their responsibility as leaders of their organisations to make a strategic assessment of the possible impact of climate change on their business and to take the range of actions that would benefit the company in the long run.

Guiding against risk: Perception of risk from physical damages associated with climate change is also an important factor influencing corporate climate strategy.

Ethical considerations: There are reasons to believe that some companies are genuinely concerned with the impact their operations may have on the state of the environment and are willing to take positive actions to ameliorate the situation, especially to the extent that such positive actions do not severely affect the fortunes of the companies.

Source: Okereke 2007⁵

Things are happening at the international level and happening with influential players. In 2010, the European Retail Round Table developed the Retail Environmental Sustainability Code (Code). The aim of the Code is to promote sustainable production and consumption.⁶ The Code is voluntary and open to all European retailers wishing to join. The signatories commit to the implementation of measures that will result in a decrease of the environmental footprint of operations in: 'sourcing, resource efficiency, transportation and distribution, waste management, communication and reporting'.⁷

In 2011 ClimateWorks released a report on the Low Carbon Growth Plan for Australia and had the retail sector as part of its focus. The overall finding was that the retail sector could reduce its energy use and money spent on energy bills significantly.⁸ Such actions also had an added advantage in that they could be implemented at relatively low cost. It was estimated that full transition to a low carbon retail sector may lead to an annualised total savings of close to \$1 billion, with upfront capital expenditure of less than \$10 per square metre of floor space. Close to half of the investments offer a payback of less than five years. Barriers were also identified in the report and these included: capital constraints, long payback periods in some instances, high transaction costs, split incentives, as well as information gaps and decision process.

From a South African context, one is forced to briefly review, as part of the literature, how other food and retail chains such as SPAR, Woolworths, and Shoprite are engaging the green economy (inclusive of low carbon) transition. The food and retail chains will now be briefly considered in the next paragraphs.

The SPAR Group Limited⁹ views sustainability issues as integral components of its business strategy. Environmental stewardship at SPAR is guided by its Environmental Strategy that realises the challenges related to climate change. The critical elements associated with the changing climate include possibilities of lengthening supply chains through sourcing from longer distances, refrigeration, and other energy consuming operations.¹⁰ Other physical negative impacts on facilities, from flooding and/or droughts, are noted in the SPAR operations. SPAR fleet of vehicles contribute significantly to the group's carbon footprint through fuel consumption. Among SPAR's key operational focus are concerns on the need to undertake a carbon audit and set emissions reduction targets on energy and fuel consumption, enhanced recycling, provide leadership to retailers, and reduce food packaging. Environmental awareness is another key focus area and SPAR does this through the use of expertise in the field, advertising and conferences. In January 2012, SPAR hosted a three-day children conference on the environment.¹¹ The January conference attracted 120 children from Cameroon, Namibia, South Africa, and Swaziland. Another conference was scheduled for October 2013. Major topics covered include biodiversity, climate change, and waste recycling. The group participates in the Carbon Disclosure Project (CDP) and in 2011 SPAR achieved a score of 86 per cent in the disclosure section. The main drawback, however, was that SPAR had not yet set a GHG emissions target and planned to do so in 2013.¹²

When designing distribution outlets, SPAR comes up with a specific energy management plan for such. Energy efficiency measures at the outlets include the utilisation of low energy fittings and bulbs, timers fitted to all electronic installations, energy efficient refrigeration, and energy-efficient warehousing designs.¹³ The ever rising costs of electricity and fuel in South Africa have acted as one of the key drivers for the group to invest more in energy efficiency. Fuel efficiency projects include the establishment and implementation of optimal delivery routes, purchase of vehicles meeting minimum Euro three emissions standards, driver training and monitoring, and the conversion of used fuel from selected SPAR stores into bio-diesel. Bio-diesel consumption is on the rise with 43 200 litres used in the Eastern Cape in the 2012 financial year compared to a mere 4 500 litres used in the same province in 2011 reporting year.¹⁴ With regards to water saving measures, SPAR has initiated projects on truck wash recycling systems. Additional recycling measures include carbon and plastics.

The Woolworth group identified the need to reduce the negative impact on the surrounding environment and communities as one of the key drivers. To this end, every aspect of the design and construction of new buildings is closely examined from a social and environmental perspective. In terms of motives, the group has an intention to have its customers identify with a brand that creates value in looking after the environment and society. Woolworth has put in place the enabling framework. Its internal policy framework includes rules, procedures and policies set up to govern carbon emissions and advance climate change and going green. The group's supplier code of business principles ensures environmental responsibility from the supply chain.¹⁵ The group adopted low carbon emissions strategy that involves investing over USD13 million in 2010. This investment was aimed at helping the group in reducing carbon emissions by 109 520 tonnes in 2015. This figure was linked to achieve a 25 per cent reduction in carbon emissions per carton delivered by Woolworths own trucks by 2012. Woolworths achieved a further 3 per cent reduction in carbon emissions per carton in 2010, delivered through improved consolidation and optimisation of delivery schedules and route planning.¹⁶ In terms of transport logistics, Woolworths is targeting a 30 per cent reduction in carbon emissions from the company fleet by 2012.

From a management perspective, Woolworths has a Sustainability Committee, Sustainability and Transformation Integration Committee, and the Integrated Good Business Journey Governance Committee to help with the transition to low carbon operations. The Sustainability Committee plays an important oversight role with regards to matters pertaining to the ethos of Woolworths concerning sustainability. The Sustainability and Transformation Integration Committee also monitors, at an operational level, the progress towards meeting sustainability targets and goals. The Integrated Good Business Journey Governance Committee operates just below the Sustainability and Transformation Integration Committee.

Woolworth has worked effectively on energy efficiency resulting in a decrease in consumption by 18 per cent in 2010, based on the 2004 benchmark. The group 'rolled out

new lighting and energy measurement technologies, as well as retrofitting refrigeration technologies and reviewing distribution methods to meet its 30 per cent relative reduction target for 2012'.¹⁷ Since 2009, the group managed to retrofit 98 supermarkets with high efficiency fans.¹⁸ Other low carbon initiatives at Woolworth include farming for the future; in-store recycling; use of completely recycled paper; and mobilising its customers for a low carbon lifestyle. Farming for the future manages farming systems with the view to be organic and minimise chemicals. The initiative also focuses on soil, water quality, and biodiversity management.

The 2012 Shoprite Holdings Limited¹⁹ sustainability report makes observations on developments in the climate policy negotiations that took place in Durban in 2011, resulting in an agreement to extend the life of the Kyoto Protocol. The report also makes mention of the introduction of the Corporate Value Chain (Scope 3) and Product Life Cycle Standards developed by the Greenhouse Gas Protocol, which are drivers for companies to engage the green economy. Increases in electricity prices during the reporting period resulted in the group's bill going up by 34 per cent and this was and remains a strong driver for Shoprite to go low carbon, particularly in energy efficiency.²⁰ To this end, since 2009, the group has put in place holistic energy consumption measuring, monitoring and verification systems in its supermarkets. Work is at advanced stages within the group to develop prototype energy consumption monitoring benchmarks for different kinds of stores. Smart refrigeration and tele-maintenance systems are being rolled out. With regards to smart refrigeration, the group aims to have a centralised system of monitoring. In association with Eskom, Shoprite has initiated a project on light retrofitting in all its stores, and an estimated three megawatts of energy will be saved.²¹

A number of other low carbon initiatives are taking place with regards to distribution. Shoprite distributes centrally, permitting savings in fuel consumption as the number of supplier vehicles is minimised.²² Operational and fuel efficiency initiatives include, among them, vehicle routing and scheduling implemented at all distribution points to optimise travel distances and driving times. The group has also initiated reverse logistics to optimise the movement of equipment and unsold goods. The group is also concerned with excessive packaging and re-using of damaged goods. Lastly, during the reporting period, Shoprite initiated its carbon footprint and was ready to report on Scope 2 emissions.

THE BUSINESS CASE AT PICK 'N PAY

Pick 'N Pay's uptake of green technologies and practices in the value chain is mainly motivated by risk management. It is also influenced by the desire to create value, seizing new opportunities related to the group's operations and its product range. The drivers for transition to a low carbon and greener Pick 'N Pay could be categorised into three, namely: physical and related; regulatory; and other associated. These drivers will be considered in much depth in the following paragraphs.

Among the physical and related drivers is included costs associated with impacts on supply chain. Such costs relate to increasing procurement costs associated with products and or raw materials, as well as the disruptions in availability of certain products and or raw materials. The impact was noted to be higher on certain suppliers such as those in the agricultural sector. There are also costs associated with increased occurrence of extreme weather events that lead to increasing logistics expenses. Volatility in food prices and limited capacity to be absorbed into consumer prices emerged as drivers under the physical category. Food prices are linked to socio-political instability. The changing geographic location of sources leading to shifting logistics infrastructure and associated costs were noted. The negative effects on employee and stakeholder well-being in certain areas, including increasing and changing disease patterns, increased exposure to extreme weather events and the like, were highlighted too.

From the regulatory environment, drivers were noted at both the national and international levels. In South Africa, Pick 'N Pay noted that the government has committed to a 34 per cent reduction below a business-as-usual greenhouse gas (GHG) emissions reduction trajectory by 2020, and a 42 per cent reduction by 2025.²³ The GHG emissions trajectory has been interpreted in the National Climate Change Response Policy of 2011.²⁴ Internationally, policy pronouncements by the G8 Summit in July 2009 were noted. The G8 committed to prevent global temperatures rising beyond 2°C and to cut GHG emissions by between 50 per cent and 80 per cent by 2050. COP16 did not result in a binding legal agreement. However, it signalled an unprecedented level of political agreement on the need to limit global temperature increases to 2°C. The COP17 (Seventeenth Session of the Conference of the Parties) has built on these negotiations through the signalling of the need for an inclusive international agreement on climate change. From Pick 'N Pay's point of view, these high level commitments and subsequent regulation will impact on the group's core business and its stakeholders, including suppliers and customers. Likely impacts of such pronouncements are higher fuel and energy prices,²⁵ lower disposable income, and changing demand for specific products.

Under the category 'other drivers', Pick 'N Pay identified the changing market and stakeholder expectations regarding food retailer performance on climate change. Certain customer groups were observed to be increasingly including climate considerations in their purchasing decisions. In addition, many non-government organisations (NGOs) and civil society organisations were viewed to be motivating strongly for changes in government policy and business practice towards a low carbon and greener future. The changing technology and uptake by business peers also came up, as well as the role played by new products and technologies to reduce energy use and/or carbon emissions.

PICK 'N PAY'S ENABLERS

At a broader scale, the Pick 'N Pay sustainability vision aligns with food security. The transition to green economy at the group is woven through the six thematic elements of the sustainability strategy. The sustainability strategy process includes the identification of impacts, risks, and opportunities associated with the operations, and focusing these material concerns into a sustainability framework. Within this sustainability framework, the group is evaluating all other sustainability related policies and developing further policies where necessary. Pick 'N Pay is also rolling out several sustainability initiatives, including internal communications and training, to build internal capacity to address sustainability as a business. External consultants have also been engaged to develop a climate change strategy that responds to the specific exposure to climate related risks and opportunities. Mapping of exposure to environmental risks in the supply chain is underway.

FLAGSHIP BREAKTHROUGH AT PICK 'N PAY

Pick 'N Pay's breakthrough to a low carbon and greener company is driven and distributed across the six sustainability focus areas that are all aligned to the group's core business strategy. The six sustainability focus areas²⁶ are depicted in Figure 15.1. Although some might view selected sustainability focus areas as key in a low carbon and greener Pick 'N Pay, this chapter considers them at equal footing. In fact, many other initiatives building the case for the breakthrough link directly to the six sustainability focus areas. To this end, these will be documented as such.

The sustainability framework provides the basis for managing Pick 'N Pay's diverse initiatives and finding opportunities to leverage the supply chain and the brand. The group is taking the lead on several industry issues relating to sustainable sourcing. Cooperation and partnership are viewed as pillars in making lasting shifts to greening industries. In this regard, Pick 'N Pay has partnered with World Wide Fund for nature (WWF) on the sustainable fisheries initiative. The role of the small-holder agriculture in the future green economy and ensuring food security at a community level has been embraced, and the Pick 'N Pay foundation is working with the small-holder farmers towards sustainable small-holder agriculture. The sustainability framework also guides in respect to energy efficiency, an aspect that makes the group competitive in the context of national and international pressures on energy consumption, price and security.

Figure 15.1 Pick 'N Pay sustainability focus areasSources: Author²⁷

The focus area on providing safe food and expanding sustainable product lines creates value in that it promotes health (human capital) and the good functioning of natural systems (natural capital). It links to Pick 'N Pay's business strategy by addressing the increasing demand for environmentally responsive products. Such products address the whole supply chain in driving innovation and action. The group became the pioneer in South Africa in committing to sell only sustainable seafood by 2015.²⁸

To assist in the development of a resilient and reliable supply base, Pick 'N Pay offers market access for emerging small-scale producers and suppliers. This is referred to within the Pick 'N Pay system as the social and financial capital. The initiative supports existing supply chain initiatives leading the consolidation of the group's relationship with its suppliers. The empowerment programme presents opportunities for career development, a facility that enhances social inclusiveness and change. This is an element referred to by Pick 'N Pay as the human capital. Through this initiative employees are enabled to act as brand ambassadors for social responsibility within the low carbon and greener environment. In working for a clean and healthy environment, Pick 'N Pay enhances eco-system function and restoration. This is a focus on natural capital that the group so needs and values. Environmental risks, particularly the adverse impacts of climate change, are addressed leading to cost reductions in the short, medium and/or longer term. In the 2012 reporting period, the group recorded significant energy savings due to projects addressing in-store energy efficiency as well as through logistics optimisation.²⁹

In addition, carbon emissions were reduced by 5,6 per cent from 2011.³⁰ The initiatives on energy efficiency and awareness have not gone unnoticed. During the reporting period an Africa Energy award for 'Energy Project of the Year' and the Eskom Eta Award for 'Energy Efficiency Awareness' were conveyed.

Enhancing governance and accountability was reported as one of the six sustainability focus areas. This initiative has led to the development of trust and accountability between stakeholders, as well as ensuring compliance with existing and emerging codes of good governance. In 2012, Pick 'N Pay's CDP score improved to 86 per cent from 77 per cent in 2011, and the group also featured in the CDP Performance band 'A'.³¹

From the six sustainability focus areas have emerged many initiatives, among them being: sustainable packaging initiatives; recycling programmes; sustainable product innovation; small-holder agriculture support; sustainable fishing partnership with WWF; sustainable farming audits; supply-chain physical risk mapping and distribution network optimisation; in-store energy efficiency roll out, and improvements in refrigerants. Some of the initiatives highlighted here will be discussed further in the following paragraphs.

Pick 'N Pay has implemented several pilot programmes to reduce its packaging, switch to better material options and encourage recycling. A number of these have met with success and the reductions have been integrated across several product lines. The group introduced 25 per cent Recycled PET (RPET) in a range of packaging and makes use of lightweight boxes manufactured from recycled materials for Pick 'N Pay house brand oats, as well as its corn flakes, bran flakes, and rusks.

The group works with waste management service providers to increase the proportion of waste that is recycled, rather than directed to landfills. The roll-out of the Pick 'N Pay waste recycling programme was completed in 2011. Over 6 000 tonnes of waste is recycled with recycling facilities in all corporate stores annually. This programme also incorporates education and awareness that encourages recycling efforts and present recycling options to customers.

The Pick 'N Pay Green Range initiative of the mid-1990s grew phenomenally in the first decade of the Twenty-first Century leading to 2010. The group has embarked on a drive to source products from environmentally sustainable farming practices. Products are also sourced from sustainable small farming communities and operations that are accredited to the Fairtrade-certified products and the Sustainable Fisheries programmes.

Small-holder agriculture is widely acknowledged to be part of long term food security in a low carbon and greener economy. In 2010 Pick 'N Pay officially launched the Small Business Initiative through its Small Business Incubator. The Small Business Initiative aims to address the historical legacy of institutionalised socio-economic inequality in South Africa. In addition to creating at least 2 500 new jobs, this initiative has introduced approximately 57 000 new product units into their supply chain.

A three-year Sustainable Fisheries Programme partnership agreement with WWF's was concluded in 2010. The agreement will see Pick 'N Pay providing funds to support the WWF Fisheries programme. The aim is to restore over-exploited fish stocks to

sustainably managed levels. The programme also aims to maintain or improve the state of other stocks by applying an Ecosystem Approach to Fisheries and reduce the impacts of destructive fishing practices. Pick 'N Pay will contribute R6,1 million over the course of the project.

Pick 'N Pay sources products from environmentally sustainable farming practices. Some larger Pick 'N Pay suppliers implement their own sustainability programmes. The group has started to formally engage farmers in its supply chain to assess the sustainability of their practices. This is a model practice given that the larger percentage of GHG emissions in most operations is from the supply chain. The outcomes of this process will be used to build a robust framework for managing sustainable farming practices.

An initiative to audit Pick 'N Pay's Longmeadow Distribution Centre has resulted in greening it. This has helped the group to optimise their logistics network by tightening data management and centralising distribution. In addition, huge sums have been channelled into energy efficiency and these have also proved to have a short payback time. Costs into energy meters have been recovered through decreases in energy bills. An estimated R2,4 million has been invested into energy meters. A shift to less harmful refrigerant gases is ongoing and more initiatives like such are expected in the future.

KEY CHALLENGES AND FUTURE GREEN ECONOMY INITIATIVES

As a retailer, Pick 'N Pay is well aware of how over-consumption will limit the achievement of a sustainable society within ecological limits. As retailers, the group acknowledged that it is part of the key players that contribute to the trend of increasing consumption. However, the group is aware of the fact that many of its customers are part of an emerging economy that consumes far less per capita than those within the economies of the Western world. Nevertheless, Pick 'N Pay continues to debate these issues in the retailers' forums so that it stays on top of thought leadership in these areas.

Among the noticeable key challenges is the growing demand of food that might result in a wider use of genetic modification to increase drought tolerance. Pick 'N Pay plans to continue driving resource efficiency in terms of energy, packaging, waste, and water. This will be done against a background that the group's major mission is to contribute to food security. The group aims to expand its supply chain initiatives, and drive sustainability through initiatives run in its technical division and throughout the organisation. Energy and fuel use will be reduced through decreasing the amount of materials used. The group is aware of customer concerns about packaging waste and products that are deemed over- packaged. The group intends exploring possibilities of registering Clean Development Mechanism (CDM) projects under the Kyoto Protocol.³² Pick 'N Pay is also worried about large volumes of packaging materials and is committed to procure greener packaging solutions so as to allow higher recycling rates.

CONCLUSION

It is clear that Pick 'N Pay's six sustainability focus areas have helped the group in its transition towards a green and low carbon economy. The case study indeed reveals that all the initiatives linked to the sustainability focus areas are important in having Pick 'N Pay realise its sustainability strategy. The group also realises that it is better positioned to influence other aspects of the green economy that include incentivising green agricultural practices, supporting sustainable small-holder agriculture, moving towards green logistics, creating markets for greener and more sustainable products, and influencing consumer choices through product offering. Pick 'N Pay's involvement with the CDP and its intention to develop CDM projects under the Kyoto Protocol are testimony to a growing green economy agenda and its move beyond corporate green washing.

NOTES AND REFERENCES

- 1 Nhamo, G., 2008. Regulating plastics waste, stakeholder engagement and sustainability challenges in South Africa. *Urban Forum*, 19(1), pp. 83–101. Available at <http://dx.doi.org/10.1007/s12132-008-9022-0>.
- 2 Okereke, C., 2007. An exploration of motivations, drivers and barriers to carbon management: The UK FTSE 100. *European Management journal*, 25(6), pp. 475–486.
- 3 Papathanassiou, D. and Anderson, D., 2001. Uncertainties in responding to climate change: On the economic value of technology policies for reducing costs and creating options. *Energy journal*, 22(3), pp. 36–76.
- 4 Okereke, C., 2007. Op Cit.
- 5 Ibid.
- 6 European Retail Round Table., 2010. Retail Environmental Sustainability Code. Brussels: European Retail Round Table.
- 7 Ibid.
- 8 ClimateWorks Australia., 2011. Low carbon Growth Path for Australia. Clayton: ClimateWorks Australia.
- 9 SPAR Group Limited., 2012. The SPAR Group Limited Integrated Annual Report for the year ended 30 September 2012. Cape Town: The SPAR Group Limited.
- 10 Ibid.
- 11 bid.
- 12 Ibid.
- 13 Ibid.
- 14 Ibid.
- 15 Woolworth., 2010. Woolworths Good Business Journey Report 2010. Cape Town: Woolworth.
- 16 Ibid.
- 17 Ibid.
- 18 Ibid.
- 19 Shoprite Holdings Limited., 2012. Shoprite Holdings Limited sustainability report 2012. Shoprite Holdings Limited. Cape Town: Shoprite Holdings Limited.

Chapter 15

20 Ibid.

21 Ibid.

22 Ibid.

23 This point has been solidified by the publication of the National Development Plan: vision for 2030 in November 2011 by the National Planning Commission.

24 DEA., 2011. National Climate Change Response Strategy. Pretoria: DEA.

25 Pick'N Pay., 2012. Pick 'N Pay integrated annual report 2012. Cape town: Pick 'N Pay.

26 Ibid.

27 Author. (Based on Pick 'N Pay. 2012. p. 36).

28 Pick 'N Pay., 2012. Op Cit.

29 Ibid.

30 Ibid.

31 Ibid.

32 Ibid.

16

Addressing carbon reduction through civil aviation industry's four pillar strategy implementation at South African Airways

Godwell Nhamo and Chipso Nyamwena-Mukonza

ABSTRACT

Flight EK764/SA7158 presented a revelation to one of the authors of this chapter when it emerged that there was onboard recycling on the route from OR Tambo International to Dubai International on 18 January 2012. Given the focus of this book, the recycling initiative came across as some kind of a breakthrough. However, on further investigation, it emerged that the global civil aviation industry was on a huge drive to move towards a greener and low carbon economy through its four pillar strategy. The four pillar strategy commits the global civil aviation industry to: (1) the use of cleaner fuels (2) fuel efficiency (3) route improvements, air traffic management and airport infrastructure improvements (4) the implementation of positive economic instruments to achieve GHG reductions. South African Airways (SAA) has networked well into the four pillar strategy. SAA indicated on 21 November 2011 that the airliner will be using bio-fuels to satisfy half of its fuel demand by 2020. SAA has embarked on numerous other projects designed to move the company from their present position to a sustainable corporate, including: Comprehensive Carbon Footprint Reporting; Voluntary Offset Programme for passengers and SAA's own corporate travel; projects such as Solar Water Heater initiative for staff that generates carbon credits; energy efficiency initiatives; clean energy self-sufficiency; and fuel and efficiency initiatives, including air traffic management cooperation and improvement programme.

INTRODUCTION

This chapter profiles how SAA has responded to the global aviation industry's calls for action on climate change. A large body of literature now exists in the public domain with regards to the realities of climate change and the aviation sector. Within the aviation industry, the following key stakeholders can be identified: aircraft operators, manufacturers,

fuel suppliers, airports and air navigation service providers.¹ Given that the industry is so intertwined, global aviation leaders prefer a situation where fighting climate change is done at the global level, whilst taking a sector approach. The same also applies to considering the entire supply chain which influences the aviation industry's environmental performance through designs and the deployment of products and services supply.²

According to the Intergovernmental Panel on Climate Change (IPCC), as of 2005, the aviation industry was indicated as being responsible for about 2 per cent of total human induced carbon dioxide (CO₂).³ This translated to an estimated 649 million tonnes of the 34 billion tonnes emitted globally. In 2009, a total of 1 715 airlines operated a fleet of 23 000 aircrafts serving 3 750 airports with over 160 air navigation service providers.⁴ Given this significant role the aviation industry plays in economic growth, as well as the significant contribution in terms of greenhouse gas (GHG) emissions, it makes sense that leaders consider how best the industry concerned could move towards a low carbon and greener economy now and into the future.

In 2008, 13 leading companies in the aviation industry, among them Airbus, Boeing, IATA, and ATAG presented the Aviation Industry Commitment to Action on climate change in Geneva during the 3rd Aviation and Environment Summit.⁵ In the commitment, the leaders recognised their environmental responsibilities and agreed to build a track record of technological progress and innovation, as well as accelerate action on GHG mitigation. The leaders declared an aspiration to be carbon neutral and carbon free in the future. Based on the International Civil Aviation Organisation (ICAO) 2007 Assembly's four pillar strategy, the leaders committed to the use of: cleaner fuels; fuel efficiency; route improvements, air traffic management and airport infrastructure improvements; as well as the implementation of positive economic instruments to achieve GHG reductions.⁶ Governments were urged to come to the party through setting up appropriate regulatory frameworks that would facilitate the breakthroughs in the areas of concern.

A GREENER AND LOW CARBON AVIATION SECTOR

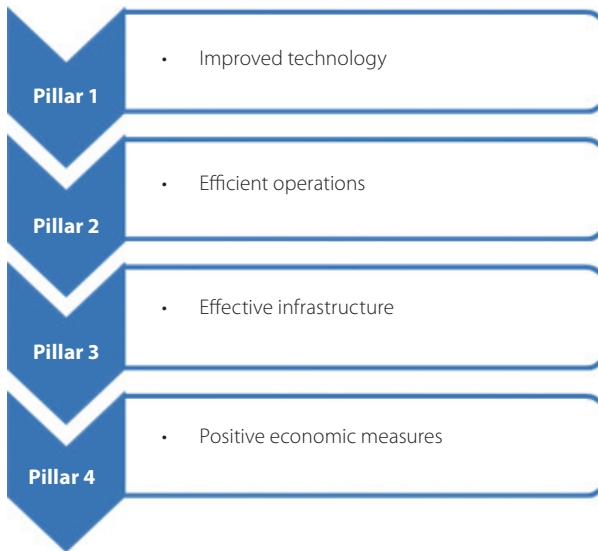
There is no doubt that, coupled with globalisation, the advent of the aviation sector has reshaped our world. As a result there has been increased demand for air travel and the aviation sector has grown more rapidly in the last decade.⁷ Global aviation contributes an estimated 1,5 per cent of greenhouse gas emissions annually.⁸ While it is appropriate to say countries must formulate policies and measures to use lower carbon fuels as a move towards reducing greenhouse gas emissions, more often than not these efforts are dependent on international treaties and international components of air travel.

At the 37th International Civil Aviation Organisation (ICAO) Assembly in October 2010, stakeholders (including governments) crafted a global agreement on a sector-based framework for dealing with international civil aviation emissions. The agreement, which was a follow-up to the 2007 ICAO Assembly, formulated global targets for the civil aviation

sector. The sector-based approach to reducing GHG emissions in the aviation sector, also received support from the G8 leaders in July 2009.⁹ In 2007, the ICAO Assembly adopted a four-pillar strategy that promoted efforts in the areas stipulated in Figure 16.1.

Figure 16.1 ICAO four-pillar strategy

Source: Authors¹⁰



In 2009, the global aviation industry proclaimed what it termed ambitious collective targets for GHG emission reductions. The targets were announced for short term to long term horizons. In the short term (2010–2020), the aviation industry committed to improve fuel efficiency by an average of 1,5 per cent annually. This represented a plus of about 17 per cent by 2020.¹¹ As from 2020, global civil aviation committed to cap its GHG emissions by having operations on a carbon neutral growth trajectory by 2050, halve net GHG emissions benchmarked to 2005 GHG emission levels. The four-pillar strategy was also communicated during COP15 in Copenhagen.¹² The sub-sections that follow will address issues in line with the four-pillar strategy and the aviation targets to 2050.

ADVANCEMENT IN TECHNOLOGY

Out of the four pillars identified, technology seems to be the one with quick returns. There has been major breakthroughs in this regard with advances in technology including 'revolutionary new aircraft designs; new composite lightweight materials; radical new engine advances; and the development of sustainable alternative jet fuels which could reduce CO₂ emissions 80 per cent, on a full carbon life-cycle basis'.¹³ At another level, aviation is concentrating on bio-fuels development from second generation sources like algae, non-food crops, and waste

biomass. The bio-fuels can be blended with jet fuel in increasing quantities. The International Air Transport Association (IATA) estimated that airlines will spend \$1,5 trillion on new aircrafts by 2020 with some 5 500 aircrafts being replaced by the same time.¹⁴ The IATA's technology roadmap identifies future technology including retrofits, production updates, new aircraft designs prior to 2020, and new aircraft designs after 2020 (Table 16.1).

Table 16.1 IATA timelines and examples of technological advancement

Technology	Parameters	GHG emissions reduction
Retrofits	• Wingless mounted on the wingtips of aircraft improve aerodynamics and reduce fuel burn • More advanced engine components for better combustion and airflow • Lighter materials for furnishing in the cabin • Less energy-consuming lighting and in-flight entertainment.	7–13%
Production updates	• More airframe structure components made of lightweight composite material instead of aluminium • Advanced engines for current aircraft production series.	7–18%
New aircraft design before 2020	• Geared turbofan engine will reduce fuel burn 10–15% • Open rotor engine will reduce fuel burn around 25% • Counter-rotating fan will reduce fuel burn around 10–15% • Advanced turbofan will reduce fuel burn around 15% • Laminar flow reduces aerodynamic drag by reducing turbulence on aircraft surface, 10–15% less fuel burn.	25–35%
New aircraft design after 2020	• Blended wing body, rather than the classical tube-and-wing architecture • Revolutionary engine architectures • Fuel cell system for on-board energy.	25–50%

Source: IATA¹⁵

Airbus and its partners have made advancements in technology, with the Airbus 380-800 (A380-800) being one of the technological breakthroughs that have changed the skies in terms of transition to low carbon aviation. A number of airlines now have A380-800s in their fleets. The Emirates, for example, had 15 A380-800 within its fleet. The A380-800 aircraft is said to be economic on fuel leading to reduced GHG emissions.¹⁶ Technological advancement for environmental sustainability in the airspace is also being witnessed from Boeing Commercial Airplanes. Boeing Commercial Airplanes launched the 747-8 that incorporates technological advancements, although issues have emerged regarding the battery systems. The 747-8 Intercontinental has 16 per cent fuel economy and another 16 per cent reduction on carbon emissions per passenger compared to the 747-400.¹⁷

Having recognised the contribution of GHG emission by the aviation sector a number of countries have begun to find ways to mitigate against global warming. Such efforts include those being made by China, Europe, and the US. China, in 2011, introduced the C919 which is a domestically manufactured aircraft and it takes cognisance of the need

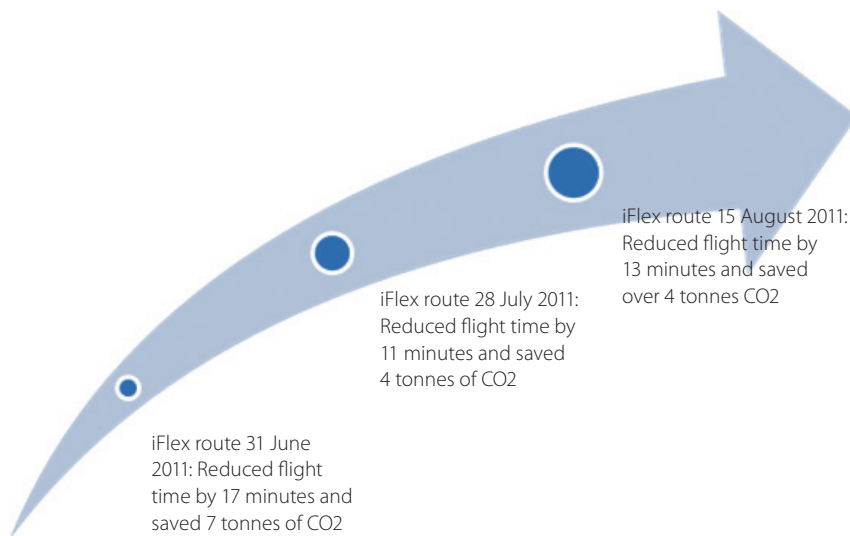
to reduce GHG emission - the project though still in its infancy promises to expand the Chinese civil aviation significantly in future¹⁸.

INFRASTRUCTURE DEVELOPMENT AND OPERATIONS

During the 5th Aviation and Environment Summit that took place in Geneva, Switzerland, the Air Transport Action Group announced further development in terms of addressing the infrastructure development pillar of the four-pillar strategy. The infrastructure plan announced revealed the introduction of continuous descent approaches at 100 airports in Europe by 2013, with 83 airports having committed.¹⁹ In addition, 22 airports in Europe have also signed up to the Airport Carbon Accreditation Programme, an aspect that draws them closer to the carbon neutral growth path.

The Air Transport Action Group also announced that IATA had introduced the iFlex, a programme aimed at providing maximum efficiency with flexible flight routings over ultra long haul. The move is said to witness a 2 per cent reduction in fuel consumption.²⁰ The South Atlantic and Africa will be the initial focus of the iFlex, with concentrations on the Johannesburg-Atlanta and Dubai-Sao Paulo routes.²¹ Pilot test of the iFlex yielded unexpected results (Figure 16.2):

Figure 16.2 IATA's iFlex trial run results – Atlanta–Johannesburg



Source: Authors²²

At the annual assembly of ACI EUROPE that took place in June 2008, the member airports adopted a resolution on climate change (known as the 'Paris Resolution') with the ultimate goal to be carbon neutral.²³ The ACI EUROPE then launched the Airport Carbon Accreditation, a voluntary certification programme a year later. The certification

programme sets an industry standard for carbon mapping, benchmarking, and management at airports. For an airport to be Airport Carbon Accredited it must fulfil a number of criteria that include carbon auditing and benchmarking, carbon reduction, carbon optimisation, and carbon neutrality. Since the launch of the Airport Carbon Accreditation programme in 2009, there has been evidence of increasing participation. In the 2009–2010 reporting period, 17 airports were registered. This number increased to 43 airports in the 2010–2011 reporting period.²⁴ Of the airports accredited in the 2009–2010 reporting period, 23 per cent were European whilst of the 43 reported in the 2010–2011 period, 43 per cent were European.

In 2011, Emirates reported that its CO₂ emissions efficiency was 26 per cent better than the global average.²⁵ The Green Flight Times magazine reported in its January–May edition that Kenya Airways, in partnership with IATA, became the first African airline to launch a carbon offsetting programme. The programme draws from IATA's carbon offsetting tool.²⁶ The offsetting tool provides a facility for passengers to be active in reducing carbon emissions by donating towards projects aimed at such initiatives.

16.3.3 SUSTAINABLE BIO-FUELS

The subject of sustainable bio-fuels was also debated at length on the side-lines of the summit. IATA acknowledges that sustainable bio-fuels may reduce GHG emissions by 80 per cent.²⁷ Concerned with the pressure that could result from the need to upscale bio-fuels production, the Roundtable on Sustainable Bio-fuels came up with 12 indicators to sustainable bio-fuels production. The indicators are summarised in Box 16.1.

Box 16.1 Global principles for sustainable bio-fuels production

1. Production shall follow all applicable laws of the country in which they occur, and shall endeavour to follow all international treaties relevant to bio-fuels' production to which the relevant country is a party.
2. Projects shall be designed and operated under appropriate, comprehensive, transparent, consultative, and participatory processes that involve all relevant stakeholders.
3. Bio-fuels shall contribute to climate change mitigation by significantly reducing GHG emissions as compared to fossil fuels.
4. Production shall not violate human rights or labour rights and shall ensure decent work and the well-being of workers.
5. Production shall contribute to the social and economic development of local, rural and indigenous people, and communities.
6. Production shall not impair food security.
7. Production shall avoid negative impacts on biodiversity, ecosystems, and areas of high conservation value.
8. Production shall promote practices that seek to improve soil health and minimise degradation.
9. Production shall optimise surface and groundwater resource use, including minimising contamination or depletion of these resources, and shall not violate existing formal and customary water rights.
10. Air pollution from bio-fuels production and processing shall be minimised along the supply chain.
11. Bio-fuels shall be produced in the most cost-effective manner. The use of technology must improve production efficiency and social and environmental performance in all stages of the bio-fuels value chain.
12. Production shall not violate land rights, taking note of hostile new generation land grabs, particularly in Africa.

Source: Authors²⁸

The month of June, 2011, saw the introduction of revised international aviation fuel standards. Basically, this meant that commercial airlines were allowed to blend conventional jet fuel with up to 50 per cent bio-fuels.²⁹ The renewable fuels 'can be blended with conventional commercial and military jet fuel through requirements in the newly issued edition of ASTM D7566, Specification for Aviation Turbine Fuel Containing Synthesised Hydrocarbons'.³⁰

Through the Bio-fuels Flight Project, the European Union (EU) 'has set a target of 2 million tonnes per year of aviation bio-fuels in Europe, in 2020, which is about 3 to 4% of the total jet fuel use. A 3% volume blend-in of sustainable 2nd generation bio-jet yearly worldwide would reduce aviation CO₂ emissions by at least 2%, which would be a reduction of over 10 million tonnes of CO₂'.³¹ With all the initiatives highlighted herein, commercial airline bio-fuels flights have been increasing and 2011 witnessed some breakthroughs (Table 16.2).

Table 16.2 Commercial airline bio-fuels flights (as of October 2011)

Airline	Date	Route	Feedstock	Notes
KLM	22 June	Amsterdam – Paris Charles de Gaulle	Used cooking oil	200 city pair flights to take place from September 2011
Lufthansa	15 July	Hamburg – Frankfurt	Mix of feedstock	1,200 flights over a six-month period
Finnair	18 July	Amsterdam – Helsinki	Used cooking oil	Flights to continue throughout 2011
Interjet	21 July	Mexico City – Gutierrez	Jatropha	Flights to continue throughout 2011
AeroMexico	1 August	Mexico City – Madrid	Jatropha	The longest flight so far and only trans-continental
Thomson	6 October	Birmingham – Arrecife	Used cooking oil	Daily operations from 2012

Source: Green Flight Times³²

In its 2010 Corporate Responsibility and Sustainability Report, Airbus indicated that it was driving the promotion of the industrialisation of sustainable bio-fuel production globally.³³ The group was also involved in establishing bio-fuel production projects in Brazil and Romania. The Brazilian Biokerosene Platform bio-fuels project was expected to start production by the end of 2013, supplying Rio de Janeiro and San Paolo airports. The project will utilise jatropha plant and sugar cane biomass in its production lines. In Romania, Airbus is working with TAROM Romanian Air Transport and other key stakeholders to develop bio-fuels from the camelina plant. Camelina is a common local plant in Romania. Airbus is also involved in Qatar, with the Qatar Advanced Bio-fuel Platform. The platform is pioneering the first large-scale bio-fuel value chain that uses algae as a feedstock. It is anticipated that with time, projects utilising second and third generation

bio-fuels feedstock will propel a sustainable bio-fuels production agenda. Airbus is committed to witnessing the aviation industry supplied 30 per cent of all fuel demands from bio-fuels by 2030.³⁴ The IATA aims to have member airlines utilising 10 per cent 'alternative' fuels by 2017.³⁵ On 22 March 2012 the leading airframe manufacturers - Boeing, Airbus, and Embraer - agreed to collaborate on a project to develop affordable bio-fuels.³⁶

POSITIVE ECONOMIC MEASURES

Economic measures should be transparent, administratively simple, and implemented based on consensus from the governments and global aviation stakeholders in the value chain.³⁷ Economic measures may include emissions trading, carbon funds, offsets or any other deemed appropriate.³⁸ Such economic measures should minimise 'carbon leakages', a situation whereby emissions transferred between countries or carriers result in market distortions without additionality, in terms of GHG emissions reduction. Measures put in place to mitigate GHG emissions from the aviation industry must institute a single payment, whether from international or domestic flights. In as much as governments will be pressed for revenues, the global aviation sector prefers ring-fencing of the revenues. This implies that all revenue accrued should be used for the purposes of addressing environmental concerns.

While greener skies are desirable, the aviation sector faces a number of challenges. First and foremost the issue of international jurisdiction and bilateral agreements has had limiting effects, as smaller airlines find it difficult to compete with bigger airlines which are now enjoying economies of scale. The ICAO has been given the mandate to curtail global aviation emission, but to date little agreement exists on specific policy options.³⁹ Therefore, it does not come as a surprise that there is no consensus on price of carbon tax internationally. It goes without saying that there is a high level of risk in research and development costs, for example the introduction of bio-fuels may require re-engineering of aircrafts. In developing countries, there is lack of government regulation and support, which generally impedes on efforts towards promoting lower carbon emission and mitigation.

SAA IN GLOBAL CIVIL AVIATION LOW CARBON FOOTSTEPS

This section is dedicated to discussing the position of SAA. Such a discussion will proceed from the point of profiling the SAA group, including its brief history. The section also considers the business case for SAA's low carbon pathway, enabling environment, current and future plans for fully embracing a low carbon economy, as well as challenges being encountered. It must be noted that SAA is in the initial phases of addressing transition to a low carbon and greener airliner, having started the journey in 2010. These and other developments at SAA will now be considered in greater depth in the following sections.

BRIEF PROFILE OF SAA

South African Airways is a state owned enterprise (SoE) which falls under the Department of Public Enterprises (DPE). SAA is one of the oldest airlines in Africa, having been in operation since 1935 (past 77 years). In the last decade, the company has received many accolades for its excellent services. The reason behind its success lies in its ability to operate commercially while at the same time, like many other state owned airlines, fulfilling the government objectives and initiatives as outlined by the policies that govern it.⁴⁰ SAA undertook a restructuring programme in 2007, when the economy was still strong and growing, aimed at reducing costs while remaining competitive. Since then, the corporate strategy has been cost containment and revenue improvements and this has now been integrated into the core strategy of the organisation.⁴¹

The restructuring programme provided a good base from which to deal with many challenges which came SAA's way, such as the environmental pressures. The period 2007–2008 was a difficult year for most airlines with global economic recession taking its toll, increase in oil prices, as well as the rising conflicts in the Middle East. The SAA also had its fair share of internal challenges, running with acting chief executive officers (CEOs). However, SAA reported a profit margin in this period. SAA introduced a low cost carrier, Mango, which enables it to operate at a low cost but efficiently and as well as providing guest service delivery. SAA has three other subsidiaries companies which are SATravel Centre (SAA corporate and leisure), Air Chefs (SAA's in-flight catering business), and South African Airways Technical (SAA maintenance repair organisation) which are doing well in their own right as well as servicing other airlines in the region. Over and above, SAA as a SoE and a commercial enterprise has a clear understanding of its role and is strategically positioned to handle challenges that may come its way.

PARTNERSHIPS AND DRIVERS TOWARDS A LOW CARBON AIRLINER

SAA is a member of IATA with which the company has a strong partnership in terms of its efforts towards greener and low carbon skies. IATA has set goals and guidelines to low carbon transition which its members must adhere to.⁴² From time to time the association holds conferences, which allow information and/or latest research dissemination. SAA is also a member of the South African Civil Aviation Authority (SACAA) whose mandate is to ensure industry compliance with applicable civil aviation regulations and the standards and recommended practices (SARPSs) as defined by the ICAO.⁴³ In its 35th ICAO Assembly meeting, the organisation urged its member states to develop the means to limit the environmental impact of aircraft emissions. The United Nations Framework Convention on Climate Change (UNFCCC) requested the ICAO to develop policy options for reducing aircraft emission. Being a member of international organisations has presented SAA with the opportunity to keep abreast with the latest technologies, legislations and other developments linked to movements towards a low carbon global civil aviation industry.

South African Airways conducts a global business, which is inherently carbon intensive but necessary and vital to the developmental state policy objectives of South Africa. The global airline business is incredibly competitive and subject to numerous external drivers that place pressure on costs and strain balance sheets and income statements that affect all airlines. All airlines strive for the most efficient operations in order to minimise fuel usage and thereby costs, which has the added benefit of fewer emissions.

As a result of the intense competition present in the aviation industry, SAA cannot afford to lag behind and be perceived as a market follower rather than a market leader. In the developed world of Europe, environmental issues are increasingly becoming an important consideration to each consumer, placing pressure on corporates to become environmentally responsible. These corporates, in pursuit of environmental credentials, demand greener supply chains and a lowering of their own emissions. This then limits their choice of vendors to those that are actively pursuing their own green credentials. This behavioural shift has already affected SAA's business and SAA sees the trend increasing and becoming even more relevant the world over. In the short term, SAA is looking at implementing voluntary carbon offsetting projects in the forestry sector in the region.

Additionally, the SAA group, as a state owned entity, also has a duty to the people of South Africa to run in the most responsible and efficient manner possible and is answerable to their shareholder, the DPE. The DPE has been working closely with state owned companies (SOC) to develop a comprehensive climate change framework within which each SOC will work to further environmental and efficiency goals, and each SOC is answerable to the minister.

The legislative environment can be viewed as an enabler towards greener aviation. A number of regulations govern SAA's activities, including the South African Airways Act No 5 of 2007, and South Africa's Climate Change Response Strategy White Paper of 2011. South Africa's National Climate Change Response White Paper posits that South African companies must come to the party in terms of reducing GHGs.⁴⁴ In 2010, the National Treasury Department of South Africa released the Carbon Tax Discussion Paper.⁴⁵ In the paper is enshrined a carbon tax that forces companies to reduce their GHG emission. The discussion paper has been developed into a policy paper that was published for further comments in May 2013, with an additional element of the need to move towards a green economy.⁴⁶ The policy paper was scheduled to be finalised before the end of 2013.

At the international level, the European Union Emission Trading Scheme (EU ETS), which come into effect in 2012 as drawn from the Kyoto Protocol, also affects SAA. The EU ETS has now taken measures to include an international aviation trading scheme. The international aviation trading scheme is another market-based system that requires the airlines to buy permits to pollute the air. What is more interesting is that the EU has been the biggest buyer of carbon credits in South Africa. However, the EU indicated that with a second commitment period of the Kyoto Protocol it will buy credits from other developing countries other than South Africa. This is a fact that brings a problem for South Africa which is ranked the 11th greatest emitter in the world.

In his pre-COP17 speech, the minister responsible for SOCs highlighted that there was need for these organisations to demonstrate leadership in the manner in which they engage climate change. To guide SOCs in addressing climate change, the Department of State Enterprises developed a Climate Change Policy Framework based on four key principles:⁴⁷

- Firstly, to optimise the overlap between commercial, economic, developmental, and environmental objectives, whilst carefully managing areas where these objectives conflict
- Secondly, the integration of climate change, broader environmental and green economy considerations into the state owned companies' planning, procurement and operational processes on an on-going process or learning and continuous improvement basis, rather than a big-bang approach
- Thirdly, there must be flexibility in the way the SOC responds to the challenges of climate change given the diversity of sectors within which the SOC operate
- Finally, the development of the green economy requires a high level of collaboration across SOCs and between SOCs and government. The shareholder will have to play a facilitating role in this regard.

The Department of State Enterprises' Climate Change Policy Framework aims at initiating processes of mainstreaming climate change and green economy considerations into the SOCs planning processes. It is also hoped that the framework will facilitate high level collaboration between SOCs and government with regard to the efficient implementation of the green economy transition.⁴⁸ The SOCs are required to benchmark their GHG emissions reduction targets, an aspect viewed as more effective in terms of accountability. The minister responsible, however, expects that in the long term the department will set collective targets for SOCs.

LOW CARBON INITIATIVES AND ENABLERS FROM SAA

In its 2012 annual report, SAA indicated that it was 'committed to becoming one of the world's leading green airlines through a range of measures based on a holistic and comprehensive group environmental policy'.⁴⁹ A number of strategies have been put in place by the airline in its quest to become environmentally friendly. In 2010 under the guidance of CEO Siza Mzimela, SAA established the Group Environmental Affairs programme to change the way that SAA conducts business. This demonstrates that SAA has elevated the environmental portfolio to a strategic risk that must be addressed. SAA has implemented an environmental policy framework and is targeting ambitious environmental strategic goals that are measureable and deliverable for the next 10 years, and that aims to change the way that SAA conducts business and changes the mind-set of all staff. SAA has resolved to be the world's greenest airline by the year 2022. In the domestic and

African markets, very few airlines have committed to changing their businesses from a purely economically driven venture to a business that holds sustainability as a core pillar of the business.

In 2010, the commitment from the CEO to drive SAA forward as a business in a sustainable and responsible manner was revealed when a department to focus solely on changing the business's focus to incorporate sustainability was established. This department became functional in July 2011 when two environmental specialists were appointed. The Group Environmental Affairs Department reports directly into the executive in the Office of the CEO responsible for group strategy. The department enjoys a flat and effective reporting structure with support for programmes and projects running through to 2022, designed to make SAA the clear leading sustainable airline in Africa by 2017, and the greenest airline in the world by 2022. SAA takes issues pertaining to transition to a green economy seriously and the activities undertaken thereof are based on a belief system that 'being at the forefront of the green economy will deliver considerable benefits and create scope for a real competitive advantage to be created in support of the group's expansion and growth plans'.⁵⁰ In 2012, SAA finalised and adopted both the group's Environment Policy and group's Environmental Strategy.

The group's Environmental Policy stipulates the need to minimise SAA's environmental impact by, among other aspects reducing the carbon footprint, waste minimisation, being energy and water efficient, raising awareness among staff, as well as working towards the global aviation industry goal. To align its operations with the global aviation industry goal, SAA stipulates its intent to 'cap aviation CO₂s emissions from 2020 (carbon neutral growth); an average improvement in fuel efficiency of 1,5 % per year from 2009 to 2020; and a reduction on CO₂ emissions of 50% by 2050, relative to 2005 level'.⁵¹ In terms of initiatives reported during the 2012 period, SAA has put in place a voluntary carbon offsetting programme permitting travellers to offset into an African environmental project launched in August 2012. SAA has also completed its carbon audit baseline based on 2010 emissions. Other initiatives on energy efficiency include retrofitting bulbs, using timers on boilers and geysers, as well as subsidised solar water heaters for staff members, leading to a potential carbon credit project for the group.⁵² Staff members were also benefitting from the 'free' energy-saving light bulbs, geyser blankets, and use of timers in their houses. Overall, the SAA has been a full member of IATA since 2011 and it also participates actively in the IATA Environment Committee.

In his pre-COP17 speech, the Minister of Public Enterprises indicated SAA would require bio-fuels to make up 50 per cent of its fuel supply by 2020.⁵³ This is a move that is viewed as appropriate in order to avoid future penalties from partners in the global aviation industry. The target pledged means a huge demand on bio-fuels that can be derived from national supplies and those outside South Africa, particularly in Africa.

KEY CHALLENGES

The key challenge encountered is the scarcity of financial resources dedicated to sustainability. As the sustainability movement gains relevance and momentum and becomes an important part of the business ethics of a responsible corporate, the process of allocating resources to effectively manage the challenges associated with the green economy becomes easier.

Coupled with this is the competitive landscape evolving in overseas markets that demands radical and constant change and improvement. SAA has been able to rapidly gear up and develop a repository of information and technical knowledge thanks to the advanced state of the aviation industry's position with regards to sustainability and the Climate Change Policy Framework provided by the DPE, which requires concrete actions and planning to meet environmental and sustainability targets. Challenges abound and the sheer scale of the environmental portfolio and the variety of projects that can be undertaken to improve the sustainability of the group is daunting. Often savings generated by sustainability projects are reflected in the business units wherein the projects are undertaken, making it challenging to justify ever increasing budget and manpower requirements.

The over-arching challenge that faces SAA is governance, both at a domestic and international level. Locally, as the government introduces the carbon tax, companies are faced with a mammoth task of how to remain competitive while at the same time maintaining a low staff turnover and increasing profits. In addition, SAA is extremely vulnerable to imposition of penalties and taxes on carbon emission due to the fact that it operates in a global market. More so, as the second commitment of the Kyoto Protocol comes into effect, the EU will not be buying carbon credits from South Africa. This raises questions on how South Africa will finance its low carbon initiatives. President Zuma, addressing business executives during the Durban COP17 conference, called for a green fund in order to facilitate a smooth transition towards a low carbon economy. Another challenge facing SAA is how to respond effectively to the rapid rises in oil prices.. Traditionally, most airlines have not been able to pass all of these fuel costs on to customers, which results in significant pressure on pricing and revenue margin retention.⁵⁴

The SAA operates in one of the most highly competitive environments. Approximately 50 different airlines fly into SAA's hub at OR Tambo International every week. The CEO of SAA, Siza Mzimela, once summarised the challenges that the company faces to include bilateral arrangements. The bilateral arrangements have limiting implications on the efficient, convenient and cost-effective service of SAA as it is forced to operate smaller aircraft more frequently. Aviation is a sector which operates in a global economy, so even if the SAA has its own policies that govern it, they need to be aligned to the international treaties. The EU ETS are viewed as having no jurisdiction to tax SAA for flights outside EU borders, but since a global solution is commendable there will always be questions regarding the global solution's fairness towards Africa.

FUTURE PLANS

Several initiatives are in the pipeline as SAA seeks to align its operations to greener and low carbon skies. The Public Enterprises Minister, Malusi Gigaba, highlighted that to avoid potential future carbon penalties, bio-fuels may have to take up to 50 per cent of SAA's fuel supply by 2020.⁵⁵ Bio-fuels for aviation are being advocated and will become a key part of aviation's future. Bio-fuels have the possibility of offering up to an 80 per cent reduction in emissions over the complete carbon lifecycle. It does not, therefore, come as a surprise that the minister calls for an intense use of bio-fuels in the aviation sector, and under his ministerial portfolio is the Renewable Energy Flagship Programme. The need to have bio-fuels also links well into the Department of Energy's scaled-up renewable energy programme, based on the Integrated Resource Plan of 2010 discussed in chapter 2.

CONCLUSION

The Twenty-first Century has witnessed an increase in demand for air transport, as globalisation takes centre stage. As a result, there has been an increase in domestic and international flights, across all airlines. The SAA airline is no exception to the latest development trends. However, with increased demand for air transport, aviation has fast become one of the greatest sources of GHG emissions that result in global warming. There is conclusive evidence to suggest that the contribution of aviation to climate change will grow very significantly in the future if the number of flights continues to grow. The focus within the aviation community has been to find permanent ways to reduce GHG emissions and move towards greener and low carbon skies.

To this end, it emerged that SAA has realised the challenge and wishes to be part of this global movement. SAA has devised a number of strategies, which include acquiring new modern fleet and partnering with international bodies like IATA to address the challenge. SAA is in strategic alliance with other airlines, such as Fly Emirates, that are ahead in terms of addressing carbon emissions. This case study has revealed that while efforts are being made towards greener and low carbon aviation, the SAA finds itself in a precarious position, as on the one hand it faces carbon taxes from the government of the day and on the other hand it faces similar moves from Europe and other progressive regions.

The bottom line, however, is that SAA is on the right path in terms of tackling the challenges head-on. SAA is therefore advised to stick (as it is rightfully doing now) to addressing the four-pillar strategy focusing on: (1) cleaner fuels (2) fuel efficiency (3) route improvements, air traffic management and airport infrastructure improvements (4) implementation of positive economic instruments to achieve GHG reductions.

NOTES AND REFERENCES

- 1 ATAG (Air Transport Action Group), 2011. The right flight to reduce aviation emissions. Durban: ATAG.
- 2 Ibid.
- 3 IPCC Emission scenarios – importance of assessing Aviation contributions to climate change. ICAO Colloquium on Aviation Emission 14–16 May 2007.
- 4 ATAG., 2011. Op Cit.
- 5 ATAG., 2008. Aviation Industry Commitment to action on Climate Change. Geneva: ATAG.
- 6 Ibid.
- 7 Boeing current market outlook 2008–2027.
- 8 A special report of the Intergovernmental Panel on Climate Change., 1999. Aviation and the Global Atmosphere.
- 9 International Air Transport Association., 2009. A global approach to reducing aviation emissions. Geneva: International Air Transport Association.
- 10 Based on Global Aviation Industry., 2011. The right flight path to reduce aviation emissions. Durban: Global Aviation Industry. p. 1.
- 11 Ibid.
- 12 ATAG., 2009. 4th Aviation and Environment Summit Communiqué. Copenhagen: Air Transport Action Group.
- 13 Global Aviation Industry., 2011. Op Cit.p. 2.
- 14 International Air Transport Association., 2009. Op Cit.
- 15 Ibid. p. 4.
- 16 EADS., 2010. EADS 2010 Corporate Responsibility and Sustainability Report. New York: EADS.
- 17 Green Flight Times., 2011a. Boeing celebrates premiere of new 747-8 Intercontinental. Edition No. 5, January-May 2011.
- 18 President of Air Commercial China.
- 19 ATAG., 2010. 5th Aviation and Environment Summit Communiqué. Geneva: Air Transport Action Group.
- 20 Ibid.
- 21 International Air Transport Association., 2010. News brief: IATA launches iFlex Programme to shorten routes. Available at <http://www.iata.org/pressroom/pr/Pages/2010-09-16-01.aspx> [Accessed 15 April 2012].
- 22 Based on reports from the Green Flight Times., 2011. Emissions-reducing iFlex flight route trial a success. Edition No. 6, May–October 2011. p. 1.
- 23 Airport Carbon Accreditation Programme., 2011. Annual Report 2010-2011. London: Airport Carbon Accreditation Programme.
- 24 Ibid.
- 25 Emirates Group., 2011. Annual Report 2010-2011. Dubai: Emirates Group.
- 26 Green Flight Times., 2011b. Kenya Airways and IATA team up to cut carbon. Edition No. 5, January–May 2011.
- 27 International Air Transport Association., 2009. Op Cit.
- 28 Based on Roundtable on Sustainable Bio-fuels., 2008. Global principles and criteria for sustainable bio-fuels production: Version Zero. London: Roundtable on Sustainable Bio-fuels.
- 29 50 Percent Bio-fuels Now Allowed in Jet Fuel. Renewable Energy World. 1 July 2011.

- 30 Meg Cichon (2 December 2011). FAA Awards \$7,7 Million for Advancement of Aviation Bio-fuels. Renewable Energy World.
- 31 IATA Fact sheet., 2011. Alternative fuels.
- 32 Green Flight Times. 2011b. Op Cit. p. 5.
- 33 EADS. 2010. Op Cit.
- 34 Ibid.
- 35 Sustainable Flight. The Engineer Online. 12 January 2009. [Accessed 30 January 2012].
- 36 Boeing., 2012. Boeing, Airbus and Embraer to Collaborate on Aviation Bio-fuels Commercialisation. Available at <http://boeing.mediaroom.com/index.php?s=43&item=2179> [Accessed 18 April 2012].
- 37 Global Aviation Industry. 2011. Op Cit.
- 38 International Air Transport Association., 2009. Op Cit.
- 39 Mc Collum, G. and Green., 2009. Greenhouse Gas Emission from Aviation and Marine transportation: Mitigation Potential and Policies.
- 40 SAA Annual Report., 2009. Available at http://www.caa.co.za/publications-files/corporate%publications/CAAannualreport2008_2009pdf.
- 41 SAA Annual Report., 2010. Available at http://www.caa.co.za/publications-files/corporate%publications/CAAannualreport_2009-2010pdf
- 42 IATA Annual Report. 2011. Available at http://www.iata.org/preesroom/documents/annualreprt_2011pdf.
- 43 SAAC Annual Report. 2010-2011. Available at http://www.caa.co.za/publications-files/corporate%publications/CAAannualreport_2010-2011pdf.
- 44 South Africa Climate Change Response Paper.
- 45 National Treasury Discussion Paper on Carbon Tax.
- 46 National Treasury., 2013. Carbon Tax Policy Paper: Reducing greenhouse gas emissions and facilitating the transition to a green economy. Pretoria: National Treasury.
- 47 Gigaba, M., 2011. Speech by Minister of Public Enterprises, Mr Malusi Gigaba MP: Launch of Eskom's Solar PV Plant at Lethabo Power Station, Vereeniging. Pretoria: Department of State Enterprises. p. 3.
- 48 Ibid.
- 49 SAA., 2012. Op Cit.
- 50 Ibid. p. 40.
- 51 Ibid. p. 41.
- 52 Ibid.
- 53 Gigaba, M., 2011. Op Cit.
- 54 SAA Annual Report., 2011. Op Cit.
- 55 IATA Annual Report., 2011. Available at <http://www.iata.org/preerom/documents.annualreport-2011.pdf> [Accessed 1 February 2012].

Emerging trends and learning points

Godwell Nhamo

INTRODUCTION

For the reader, the greatest value of this book can be drawn from its contribution in terms of analysing emerging trends and learning points from the companies that are drawn from various sectors. Among the key sectors covered in the book are: mining, energy, banking, insurance, forestry and paper, industrial, retailing, and aviation. This chapter, therefore, profiles generic aspects concerning the drivers and enablers, and offers a recap on major breakthroughs as well as insights on what needs to be done to move corporate South Africa and other business entities into green and low carbon mode today and into the future. All this should be viewed in the context of sustainable development and, especially for Africa and other developing regions, poverty eradication and job creation.

DRIVERS TOWARDS GREEN AND LOW CARBON COMPANIES

A number of generic drivers (business case) for South African companies to embrace the green and low carbon economy emerged under the following thematic areas: regulation, changing consumer priorities, energy security, financial costs, physical impacts, and reputation. The drivers highlighted herein will be briefly considered in the following paragraphs with relevant examples cited from the case studies.

More and more regulations are emerging requiring companies to be compliant and address the negative impacts of climate change and engage with the green and low carbon economy in the context of sustainable development and poverty eradication. Among these regulations are those crafted and passed at national level (domestically) and those from the international platform that come in the form of treaties, protocols, and agreements. Greenhouse gas emissions (GHG) caps and carbon taxation are a reality. Among the

international drivers for the green and low carbon economy are: the Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol on Substances that Deplete the Ozone Layer (as adjusted and amended in 1990); the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol; Greenhouse Gas Protocol; the ISO14064; Copenhagen Accord; Green Stimulus Packages; United Nations Environment Programmes (UNEP's) Green Economy Initiative; Cancun Agreements; United Nations (UN) International Year of sustainable Development; the COP17/CMP7 Decisions; and Rio+20's Future We Want outcomes. The Kyoto Protocol and its successor (Kyoto Protocol II) stand out as a landmark, as these compel industrialised countries to adhere to certain levels of GHG emissions as discussed in chapter 1. In turn, governments pass this responsibility to local companies through a number of international and domestic regulatory mechanisms. Many countries have now passed regulations on carbon trading and carbon taxation.

Typical domestic regulations for South Africa include the National Climate Change Response Strategy, Draft Carbon Tax Option, and the 2c/Kwh which was implemented in 2009 in South Africa. Mondi also identified the Carbon Disclosure Project (CDP), CDP Water, the United Nations Global Compact, and the Johannesburg Stock Exchange Socially Responsible Investment JSE SRI Index as additional self-regulatory mechanisms of importance in the country that impact the group's operations. These issues were raised in almost every company.

Financial risks are also closely linked to regulatory frameworks. For example, Gold Fields assessed the announced Eskom tariff increases of 2010 and associated emission reduction impacts from the power utility in terms of financial impacts on the mining company. With an increase in energy cost and emission reduction requirements, this translated directly into an increase of the real cost of producing an ounce of gold – or what is referred to as the Notional Cash Expenditure (NCE) per ounce of gold. The 2c/kWh tax on non-renewable electricity already equates to R20/tonne of Carbon dioxide equivalent (CO₂e), and taking into account the carbon tax on vehicles proposed in the LTMS, the cost was projected to reach R80/tonne of CO₂e in 2012. Such would increase the company's NCE by around 3,5 per cent under the worst-case scenario options. This brought home the message that climate change and its impacts can no longer be viewed as purely an environmental risk, but has moved to an issue of commercial significance.

Climate change also brings along various physical impacts. The likely impacts range from changes in rainfall patterns and temperature, and in the mining sector these translate into infrastructure impacts that include, for example, underground cooling requirements, tailings dams design, and costs. These, therefore, explain an additional driver for the business to consider lower carbon alternatives within their sphere of influence so as to ensure that they play their part in adequately mitigating local and global emissions and adapting their operations. South Africa was seen to be the most vulnerable country in terms of water scarcity compared to others in which Mondi has operations. The country is said to be water-scarce and the impact of climate change is likely to increase

water shortage, therefore water supply risks to Mondi's business becomes a challenge. The South African government has already put restrictions in terms of the expansion of plantation forestry due to water and biodiversity concerns. Such restrictions are linked to debates on food security, which is critical for a country such as South Africa. In the outlook, it is apparent that there will be increasing pressure on forestry to minimise impacts on water and biodiversity and maximise production-resource efficiency in the face of climate change.

The physical impacts of climate change on construction, health, agriculture, transport, and tourism can result in billion dollar natural disasters that can drastically affect the viability of the insurance industry. This is through costly insurance claims - especially if the insured losses occur over a large scale, as well as impacts on insurance assets. As the authors in this book note, some record breaking disasters have already been experienced globally; for example, large scale wildfire damage in Australia, the United States, and Canada, increased incidences and intensity of sea storms and hurricanes in America (e.g. Hurricane Katrina in 2005 and Hurricane Ike in 2008), Asia, and Australia, and increased frequency and intensity of droughts in Africa. The insurance industry therefore needs to actively adapt to climate change trends if it is to survive in low carbon and greener global and local economies. Hence, Santam embarked on an eco-centric journey in 2009 to bring the sector to speed with climate change and the unfolding green and low carbon economy.

Changing consumer behaviours have also emerged as one of the drivers in the shift towards a green economy. Consumers the world over have become more aware of their individual, and at times corporate, choices not to purchase products that have an inherent heavy carbon content. This is an aspect that presents the risk of diminishing demand for dirty electricity that results in carbon-heavy manufactured goods and services. Hence, more and more companies are looking at alternatives to minimise use of and/or substitute dirty energy. Therefore, for companies that are coal based like Exxaro Resources and Sasol, there is a high possibility of a decline in the demand for coal (and other carbon-heavy, coal-based products) at both national and global levels. This will negatively impact on the industry. In addition, coal and coal-based product prices are likely to increase in the future due to less accessible coal and carbon regulation.

Linked to changing consumer behaviours is the reputational risks. The public's awareness around climate change is growing. Heavy energy consuming sectors like mining as well as forestry and paper industries face reputational risks if they are not seen to be 'doing' something towards using energy, natural resources, and fossil fuels efficiently, and by implication, responsibly. Along with public pressure, there is increasing pressure from investors to know how companies are responding to climate change specifically, and embracing the green and low carbon economy in general. Investors and securities regulators are paying an increasing amount of attention to how companies are responding to these challenges. By extension, it could be argued that any reputational damage such as the BP oil spill in the Gulf of Mexico could result in any company's ability to secure financing to fund future projects being compromised.

Arguments for energy security are that it is crucial that the private sector plays a role in addressing the future electricity needs of South Africa. This will reduce the funding burden on government, relieve the borrowing requirements of the power utility, Eskom, and introduce generation technologies that Eskom may not consider part of its core function, which may play a vital role in the future electricity supply options. This is in particular reference to off-grid, distributed generation, co-generation and small-scale renewable projects.

FirstRand makes it clear that the South African government's green economy agenda is well set. Such a green economy would not only see moves towards addressing the negative impacts of climate change, but to harness opportunities in creating sustainable green jobs. In addition, the group sees the shortage in natural resources globally in relation to minerals and water. To this end, it acknowledges that the current nature of the resource intense economy that exists is not sustainable. Hence, this has triggered the development of innovative and adaptation practices for the FirstRand business. Natural resources shortage will not only negatively impact on the operations of FirstRand, but also on its clients who support the economy. Changes in the climate are reported to impact the agricultural sector severely, especially in Africa to which the group provide extensive financing services. Furthermore, a large portion of the bank's key investment clients operate in the carbon intensive sectors such as mining and energy, that require significant transformation and transition towards a low carbon and greener economy. Another driver for FirstRand is the benefit of financial savings that have been achieved through in-house energy efficiency programmes, which have successfully shown how a greener operation is more efficient and cheaper in the longer term. This also assists in the sustainability of the FirstRand group as a whole.

Besides risk management, Altron's transition to a low carbon and green economy is driven by business opportunities. Climate change increases the demand for low carbon products and services. Products and services such as the photovoltaic and hybrid power schemes are provided by the group's renewable energy business, Rentech, as well as their battery business, the Powertech Battery Group, with local brands including Willard Batteries and SABAT Batteries.

The South African Airways transition to a low carbon company is mainly influenced by the external developments in the civil aviation industry sector. In 2009, the Global Aviation Industry proclaimed what it termed ambitious collective targets for GHG emission reductions. The targets were announced for short term to long term horizons. In the short term (2010–2020), the aviation industry committed to improve fuel efficiency by an average of 1,5 per cent annually. This represented a gain of 17 per cent by 2020. As from 2020, aviation committed to cap its GHG emissions through carbon neutral growth and by 2050 halve net GHG emissions benchmarked to 2005 GHG emission levels. The four-pillar strategy as discussed in depth in chapter 16 was also communicated during COP15 in Copenhagen.

ENABLERS

A number of enablers for transition to green and low carbon companies emerged and these include: company based, national and international policy frameworks; establishment of forums; establishment of committees and identification of champions. This space is dedicated to considering the internal and external enablers as implemented at company level. Appropriate examples will be cited to give a clear picture. Overall, generic enablers deal with corporate governance and these include board oversight; management execution; public disclosure; GHG emissions accounting; and strategic planning.

At Exxaro Resources Ltd, the company established a Clean Energy Forum in 2007. This led to the formulation of the Energy and Carbon Management Framework in 2008 and later a Climate Change Response Strategy and Position Statement which was finalised in 2010. These elements are managed as an integrated programme across multiple functions, and all business units. They are linked to Exxaro's vision, mission, and values, and are aligned with its Sustainable Development Strategy. The programme is monitored and driven by a steering committee with executive level representation. The steering committee considers issues of energy use, energy efficiency and climate change, and reports into corporate governance at the highest level, including the Exxaro Board.

At Gold Fields, the company manages carbon matters at the highest level, with the Board overseeing climate change risks and issues through the established Safety, Health and Sustainable Development (SHSD) Committee. The Board of Directors and executive committees are kept informed of the progress and status of the energy efficiency and CDM projects through updates at committee meetings held quarterly. Quarterly reports have contained a section on climate change, emissions and/or carbon management since 2005. To ensure climate change and carbon issues are dealt with in an integrated and formal manner, Gold Fields started off in 2009 with the development of their Carbon Management Policy Statement, which speaks to their strategic ideals. The strategy was reviewed in 2011, with its roll out imbedded in carbon management plans that had to be prepared per region. The plans formed the basis of the tactical interventions that would prepare the company to meet its business challenges associated with a low carbon economy. Gold Fields' updated Carbon Management Strategy has three major focus areas, namely: management and reporting; mitigation of GHG emissions; and adaptation to the impacts of climate change.

Sasol established the GHG Management Committee which governs strategic GHG related issues and takes decisions on behalf of the group. The GHG Management Committee was supported by a Carbon Credit Management Committee which functions as a sub-committee of the GHG Management Committee. The Carbon Credit Management Committee also governs the group's carbon portfolio. Sasol New Energy is an investment company whose role is not only to host renewable energy but also drive the implementation of energy efficiency initiatives. In addition, a Climate Change Task Team was constituted by the Sasol Group Executive Committee to assess, evaluate, and make recommendations

on pressing matters related to climate change. This task team is now operating under Project Everest.

Sasol is committed to working with governments and regulatory authorities in the countries where it operates to achieve optimum GHG management solutions. They engage both through business and trade associations like Business Unity South Africa, the National Business Initiative, Business Leadership South Africa, and directly as Sasol. They believe that business is part of the solution to the climate change challenge and that only through working in partnerships with national and international stakeholders in developing climate change related policies both in South Africa and globally can the required impetus and solutions be achieved. The group committed to substantially reduce its carbon emissions by, among others, developing more efficient production processes, and investigating carbon capture and storage (CCS) solutions. The company set several targets to reduce its GHG emissions intensity by 15 per cent (on the 2005 baseline) in all its operations by 2020, and to reduce its absolute GHG emissions by 20 per cent for all new CTL plants commissioned before 2020, and by 30 per cent for plants commissioned before 2030 (with the average 2005 CTL design as the baseline). Sasol spent R100 million (about USD11,1million) in 2009 on energy efficiency related projects, which should achieve a reduction of around 760 000 tonnes of GHG emissions a year. Sasol New Energy (SNE) was created to focus on developing options and new technologies for its operations to utilise in a carbon and water-constrained world.

Key enablers to FirstRand's transition to a green and low carbon company are best represented by its network of green and low carbon policies that include: the Environment Policy, Energy Management Strategy, subscription and the ratification of the Equator Principles, the Environment Health and Safety Policy, the Climate Change Strategy and being a signatory to the South African Energy Accord. FirstRand is also part of the CDP and provides Annual Reports to society from all its subsidiaries. FirstRand has leading governance structures for addressing climate change, a climate change policy, Board oversight and senior management responsibility, employee training and public disclosure of efforts. This places FirstRand at an advantage for effectively implementing strategy in addressing climate change risks. Sound corporate governance practices position FirstRand to take early action on emerging opportunities related to climate change. As a developing country, South Africa cannot miss the opportunity of transition towards a low carbon economy. Sustainable economic development is not a luxury, but a requirement to strategically position the economy for this century.

In 2009, the group benchmarked its carbon footprint at 10,2 metric tonnes of carbon dioxide (CO₂) emissions per capita, per full time employee. To effectively monitor and manage its carbon reduction, FirstRand proclaimed its intension to reduce its per capita CO₂ emissions from its 10,2 metric tonnes to 8,6 metric tonnes by 2012. As of 2010 CO₂ emissions per capita per full time employee was estimated at 8,7 metric tonnes. This indicator means the group was making significant progress towards realising the 2012 target.

A strong organisational structure was set up at Nedbank in order to ensure that sustainable behavioural change would permeate through the company. At the strategic level a Group Transformation and Sustainability Committee (a sub-committee of Nedbank Group Board) is in place. The sole purpose of this committee is ensuring that all environmental policies are embedded into the Nedbank group philosophy and practice. At an executive management level, a group executive is responsible for enterprise governance and compliance, and assumes overall accountability for the management of environmental sustainability. However, a Group Sustainability Committee (GSC) is available, with increased executive management level representation. At an operational level, a central sustainability team exists, which constitutes sustainability specialists and experts in environmental law, sustainability, and stakeholder engagement. This team supports the GSC in its pursuit to drive environmental sustainability across the Nedbank group.

To move towards a low carbon and carbon neutral bank, Nedbank embarked on an approach to 'reduce before offsetting'. In this regard, the bank identified behavioural change, carbon reduction targets (paper, water, electricity, travel and waste), and operational efficiencies as the main drivers. After carbon reduction initiatives had been achieved, the bank opted for offsetting using carbon credits. Nedbank has partnered with World Wild Fund for Nature - South Africa (WWF-SA) to achieve credible and sustainable carbon neutrality. This partnership has created a credible foundation which will assist the Nedbank group in creating and delivering client value, premixed with the aspect of carbon neutrality among its stakeholders.

A number of policies have been put in place by Mondi in order to enable the company to move in the direction that satisfies low carbon and greener operations. Mondi's Sustainable Development Policy outlines the overall strategy, and this is supported by sector policies which cover seven key sustainable development aspects. Among the seven key sustainable development aspects are included sustainable forestry, environmental performance, climate change, and product stewardship. All seven sector policies apply across all of Mondi's owned and managed operations. The Environment Policy forces Mondi to commit to cleaner production; conservation of raw material, water and energy; reduction of the quantity and toxicity of all emissions from operations; use of best available technology; as well as investment in clean technology.

With regards to climate change, the group's Climate Change Policy makes it clear that Mondi understands its active role in reducing GHG emissions. The group then outlines the need to improve its energy intensity; maximise existing Combined Heat and Power for energy generation; increase the use of carbon neutral biomass-based fuels; support carbon trade; and promote sustainable forest management practices. The group also commits to product stewardship that is based on the whole life-cycle initiative that draws from the principle of cradle-to-cradle. Following Mondi's Climate Change Policy, the group committed to reducing emissions of carbon dioxide from the use of fossil fuels by 15% in 2014 against a 2004 base year. The mitigation strategy includes the utilisation

of biomass to produce primary energy, carbon footprint reduction and participation in carbon disclosure benchmarking. The mitigation strategy is controlled by internal and external reporting on the Group's GHG commitments (currently reduction of specific GHG emissions by 23 per cent against a 2004 base year achieved); an increase in the ratio of biomass use for energy generation (currently 55 per cent); and the provision of product carbon footprint calculations. During 2010 the group introduced an internet-based product carbon footprint calculation tool for all its products.

Accountability for sustainable development policies, systems, practices, commitments and actions at Mondi is assured at every level of business. This is achieved through the Dual Listed Company (DLC). A DLC Sustainable Development Committee (DLC-SDC), the DLC Executive Committee, and five global specialist network groups all work together in assisting Mondi to move closer to a fully recognised low carbon and greener global entity. There is also a Sustainable Development Leadership Panel (SDLP) made up of divisional management and sustainable development experts from across the group. The SDLP is chaired by the group technical director. Its role is to advise and support the DLC executive committee and operations managers. The DLC-SDC is chaired by an independent, non-executive director and its members include the Mondi group's chief executive. The DLC-SDC also provides assurance to the boards of Mondi Limited and Mondi plc that appropriate systems and practices are in place to deal effectively with sustainability risks and sustainability opportunities, including climate change and transition to green economy. The DLS-SDC further makes sure that the group's Sustainable Development Strategy, policies, and commitments remain relevant and in line with global best practice. The group also invests in training, education, consultation, audit and other resources to ensure that they are widely understood and implemented.

In 2005, Sappi formulated a sustainability charter based on the principles of the 3Ps namely: Prosperity, People, and Planet. Drawing from the charter, Sappi has reported its sustainability performance and commitments in terms of each P since 2008. In 2008, Sappi established Regional Sustainable Development councils which report to the Global Sustainable Development Council. This body in turn reports to the Board Sustainability Committee (previously an Executive Committee). A key development in 2008 was the elevation of the executive sustainability committee into a board committee, which continues to be chaired by an independent, non-executive director and the committee agrees on sustainability objectives, and monitors targets quarterly. In South Africa in 2011, Sappi established an energy platform comprised of energy experts from each of their operations. The task of this platform is to identify energy savings in each operation with a view to complying with the commitment set out in the sustainability charter leading to the reduction in GHG emissions and the use of renewable energy, and meet the target of reducing the use of fossil fuel emissions by 15 per cent by 2015.

At Altron, the risk management approach is a key enabler in the transition to a low carbon and green economy. The risk management committee together with its dedicated sustainability department and carbon champions are responsible for climate change risk

management. These groups provide the link between operational management and the executive board. The risk management committee is made up of chief executive officers (CEOs) from the various operating companies, as well as the group chief executive and other senior executive directors and non-executive directors. Sustainability is kept as a standing agenda item at the risk management committee meetings. In addition, the chairman of the risk management committee highlights all material sustainability risks and mitigation strategies at the Altron board meetings.

The group has also appointed key individuals at board level to represent the sustainability agenda. Another key enabler is Altron's philosophy, which stipulates that managing is dependent on measuring. Altron applies this philosophy to every aspect of its climate change response, and importantly, to its climate change strategy. The group's climate change strategy is a critical enabler for changing its organisational culture into a culture that is dedicated to a low carbon and green economy.

Barloworld's defining characteristic in terms of enablers towards transition to a low carbon and green company is its integrated approach addressing environmental (including climate change), social, and financial needs. To this effect, the group has a longstanding Value Based Management (VBM) approach. The VBM approach addresses long term value creation for all the group's stakeholders and the goal of being a responsible corporate citizen. Barloworld has entrenched a sustainable development culture into its strategy by identifying it as one of the six Strategic Focus Areas (SFAs). An executive director has been appointed to oversee this as well as a group executive with responsibility for both strategy and sustainability. Sustainable development has been integrated into all operations through aligned strategic plans in terms of which all operations are required to address the group's strategic focus areas (including sustainable development) and a performance management system that addresses performance in terms of the groups strategic focus areas, related performance scorecards and rewards (including incentives).

A number of strategies have been put in place by SAA in its quest to be an environmentally friendly airline. In 2010 SAA established the Group Environmental Affairs programme to change the way that SAA conducted business. SAA has elevated the environmental portfolio to a strategic risk that must be addressed. In addition, the company has implemented an environmental policy framework and is targeting ambitious environmental strategic goals that are measureable and deliverable, including being the world's greenest airline by the year 2022. In 2010, the commitment from the CEO/Executive to drive the business forward in a sustainable and responsible manner by appointing a department to focus solely on changing the business's focus to incorporate sustainability sets SAA apart from its competitors.

The Group Environmental Affairs Department reports directly to the executive in the office of the CEO responsible for group strategy amongst other things. The department enjoys a flat and effective reporting structure with support for programmes and projects running through to 2022, designed to make SAA the clear leading sustainable airline in Africa by 2017 and the greenest airline in the world by 2022. In his pre-COP17 speech, the

Minister of Public Enterprises indicated SAA would require bio-fuels to make up 50% of its fuel supply by 2020.

WAY FORWARD

This book gives great insights in terms of what corporate South Africa is doing to remain relevant in a green and low carbon economy. This new economy is addressing issues on sustainable development, poverty eradication, and job creation. From the research done, exciting breakthroughs emerged that can be emulated by other corporate entities in the country, regionally and globally. This is the key message that should be taken as a way forward. As the world battles to continue searching for model businesses that understand the green and low carbon economy in the context of sustainable development and poverty eradication in the truest sense, testimonies from corporate South Africa will go a long way in informing this space.

For individuals and the corporate world that look forward to further engagement with the green and low carbon economy in the context of sustainable development and poverty eradication, this book adds value. The breakthroughs as identified include: Exxaro Resources Ltd's 'Powering Possibility Through Clean and Renewable Energy Technology' ventures; 'From Methane Curse to Carbon Trading' at Gold Fields; Sasol's Natural Gas Conversion and their low carbon transition flagship for the petrochemicals industry; Pele's renewable energy packages for households and small businesses across Africa; FirstRand's 'Responsible Financing and the Green Economy'; Nedbank's transition to low carbon operations; Santam's 'Eco-centric Journey: Working with the Insurance Industry Towards a Low Carbon Economy'; addressing climate change through resource efficiency and combined heat and power systems at Mondi; energy self-sufficiency for sustainably managed forestry and manufacturing operations at Sappi; 'Linking Carbon to Culture' at Altron; 'Ensuring Sustainability through Strategy' at Barloworld; Pick n Pay's supply chain connectivity, food security, and the green economy; and SAA's response to civil aviation industry's drive towards low carbon skies. A green and low carbon world is what we are looking for today and into the future.

Breakthrough

Corporate South Africa in a Green Economy

This book addresses hot issues pertaining to the manner in which corporate South Africa has engaged the emerging green global economy. Firstly, the book profiles the green and low carbon economy landscape in South Africa and interfaces it with global trends. This way, the book aligns very well in terms of the Rio+20 outcomes on “The Future We Want” that fully embraces the green global economy in the context of sustainable development and poverty eradication. The rest of the chapters in the book profile breakthroughs from selected companies. The book also comes as the second in a series that is addressing global and national concerns on the green global economy agenda. The first book entitled “Green Economy and Climate Mitigation: Topics of Relevance to Africa” was produced as part of the 17th Session of the Conference of Parties’ collaborative work carried out by the Institute of Global Dialogue, the Africa Institute of South Africa and Unisa’s Institute for Corporate Citizenship.

The book “Breakthrough: Corporate South Africa in the Green Economy” comes in seven parts. Part I focuses on the Green Economy Landscape. This part considers both the international and national perspectives. Parts II-VI present different sector initiatives namely: Mining and Energy (Part II), Banking and Insurance (Part III), Forest and Paper (Part IV), Industrial (Part V) and Retailing and Aviation (Part VI). The last part is made up of a single chapter dealing with Emerging Issues and Way Forward.

About the Editor

Professor Godwell Nhamo is a Chief Researcher and Chair for the Exxaro Chair in Business and Climate Change hosted by the Institute for Corporate Citizenship at the University of South Africa (Unisa).

UNISA



exxaro
POWERING POSSIBILITY



**Africa Institute
of South Africa**
Development Through Knowledge

ISBN 978-0-7983-0456-6



9 780798 304566